June 1977 AMC4012.4FR

IMPACT OF INDUSTRIALIZATION OF THE CALIFORNIA DELTA REGION ON AIR QUALITY

Contract No. A6-063-87

FINAL REPORT

Prepared for:

California Air Resources Board

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"The statements and conclusions in this report are those of the Contractor and not necessarily those of the State Air Resources Board. The mention of commercial products, their source or their use in connection with material reported herein is not to be construed as either an actual or implied endorsement of such products."

ABSTRACT

As part of a program to determine the impact of industrialization of the California Delta Region on air quality, the Air Monitoring Center (AMC) operated two monitoring stations built by the AMC for the Dow Chemical Company. The stations were located east of Collinsville and in Brentwood, California. Quality assurance audits were performed on the stations at the start of the monitoring program, and the zero and span of the instruments were calibrated daily. The five-minute data points have been reduced and tabulated in a data volume and one-hour averages calculated for the period from 30 August through 16 September 1976. Because of the high ozone readings in Brentwood, the data obtained at both sites for 27 and 29 August were subsequently reduced and included in this report. The AMC also provided assistance in the release of pibals during this program.

This report was submitted in fulfillment of Contract No. A6-063-87 by Rockwell International Corporation, Atomics International Division, Air Monitoring Center under the sponsorship of the California Air Resources Board. Work was completed as of May 1977.

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Atomics International Division
Air Monitoring Center

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1.0 ACKNOWLEDGEMENTS

We are grateful to the Dow Chemical Company for making two monitoring systems available to this program without cost and permitting the mobile system to be moved to Brentwood, California. These systems were assembled by the Air Monitoring Center, and at the time of this program, were in the final stages of checkout and acceptance by Dow.

We are also indebted to the Liberty Union High School in Brentwood, California for their cooperation and assistance in providing a monitoring site within a fenced enclosure. Valuable help was obtained from Dr. Michael Adams, Superintendant; Mr. Lou Bronzan, Principal; Mr. John Addington, Transportation Department; Mr. Bryan Roofe, Buildings and Grounds; and several other members of the staff.

2.0 CONCLUSIONS AND RECOMMENDATIONS

The goal of the work described in this Final Report was to obtain, reduce, and tabulate valid air quality data at two sites, and to make these data available to Meteorology Research, Inc. for their interpretation as part of the work under a parallel contract. The following daily maximum one-hour average ozone readings were observed in Brentwood, California, which is in the San Francisco Bay Air Basin:

Friday, 27 August 1976	-	0.30 ppm
Saturday, 28 August 1976	-	0.34 ppm
Sunday, 29 August 1976	-	0.37 ppm
Monday, 30 August 1976	-	0.33 ppm

The highest one-hour average ozone reading recorded elsewhere in this air basin in 1976 was 0.21 ppm in Gilroy on 7 October. The highest one-hour average reading recorded in California in 1976 was 0.38 ppm in Upland on 30 August. Because the Brentwood data stand out in comparison with other ozone data recorded in central and northern California, it is recommended that the Air Resources Board monitor ozone in or near Brentwood in the summer of 1977. There is some uncertainty in the 27-30 August ozone data because they were recorded between the startup of the system and the verification of the instrument calibration.

3.0 INTRODUCTION

A number of companies are currently planning the construction of new or expanded industrial facilities near the California delta region, where the Sacramento and San Joaquin Rivers come together and flow into the San Francisco Bay. In order to act properly on the applications for an authority to construct these facilities, the California Air Resources Board (ARB) and the Air Pollution Control Districts require more complete information than is now available on the fate of the air pollutants released at the proposed industrial sites, so that the impact of this industrialization can be better assessed. Therefore, requests for proposals were issued by the ARB, and a program of which the present contract is a part was funded.

Although the Air Monitoring Center (AMC) has a separate contract with the ARB, it has functioned in this program much as a subcontractor to Meteorology Research, Inc, (MRI). The main activities of the AMC were to:

- Move a mobile monitoring system to Brentwood, California.
- Perform quality assurance audits on the mobile monitoring system and also a system at a fixed site near Collinsville.
- Operate these two monitoring systems during the field program.
- Provide operator time for other parts of the study (releasing pibals).
- Reduce, tabulate, and report the data from the monitoring stations.
- Return the mobile monitoring systems to its original site and perform a quality assurance audit to verify the proper operation of this equipment on its return.

The monitoring systems were constructed by the AMC for the Dow Chemical Company, and at the time of this program, were still being prepared for the system acceptance tests required in the sales agreement.

4.0 THE MONITORING SYSTEMS

Two monitoring systems were used to collect data for this program at the sites shown in Figure 1. The fixed system is at site 2, whose location is shown in more detail in Figure 2. This monitoring station is located at an elevation of 201 ft on the Dow Chemical property near Collinsville, and has a meteorological tower with instruments at 10 m (33 ft) and 56 m (185 ft). Meteorological measurements include wind speed and direction, temperature, and temperature difference. Humidity is measured at the 10 m level. On the roof of the shelter there is a rain gauge and a broad band solar radiation detector. Pollutants measured and the manufacturers of the instruments are: NO-NO_x (Monitor Labs, Model 8440), SO_2 (Monitor Labs, Model 8450), O_3 (Dasibi, Model 1003AH), and CH_4-total hydrocarbons (Bendix, Model 8201A). At the time of this study, the hydrocarbon data were not reliable enough to be included in the data tabulations.

The data set at the station reads the instrument voltages every five minutes, and records the information on magnetic tape and on a digital printer. Therefore, all the data are accessible immediately after they are obtained. The computer program which transcribes the data prints the five minute readings in engineering units, and provides other information such as one- and 24-hour averages, and maximum readings each day.

To fill the gap in the network of locations at which data were recorded or were otherwise available to this study, the mobile monitoring station was moved to Brentwood, California and set up on property of the Liberty Union High School in the northeast end of the parking lot used by the school buses. The location of this site is shown in Figure 3. The instrumentation in the mobile station was the same as in the fixed station, except that there was no solar radiation detector, and meteorological data were recorded only at a height of 10 m.

Figure 4 shows the northwest-to-northeast view from the sampling intake of the mobile station in Brentwood. It is included because the winds generally came from the directions included in this figure. Except for 14 and 15 September

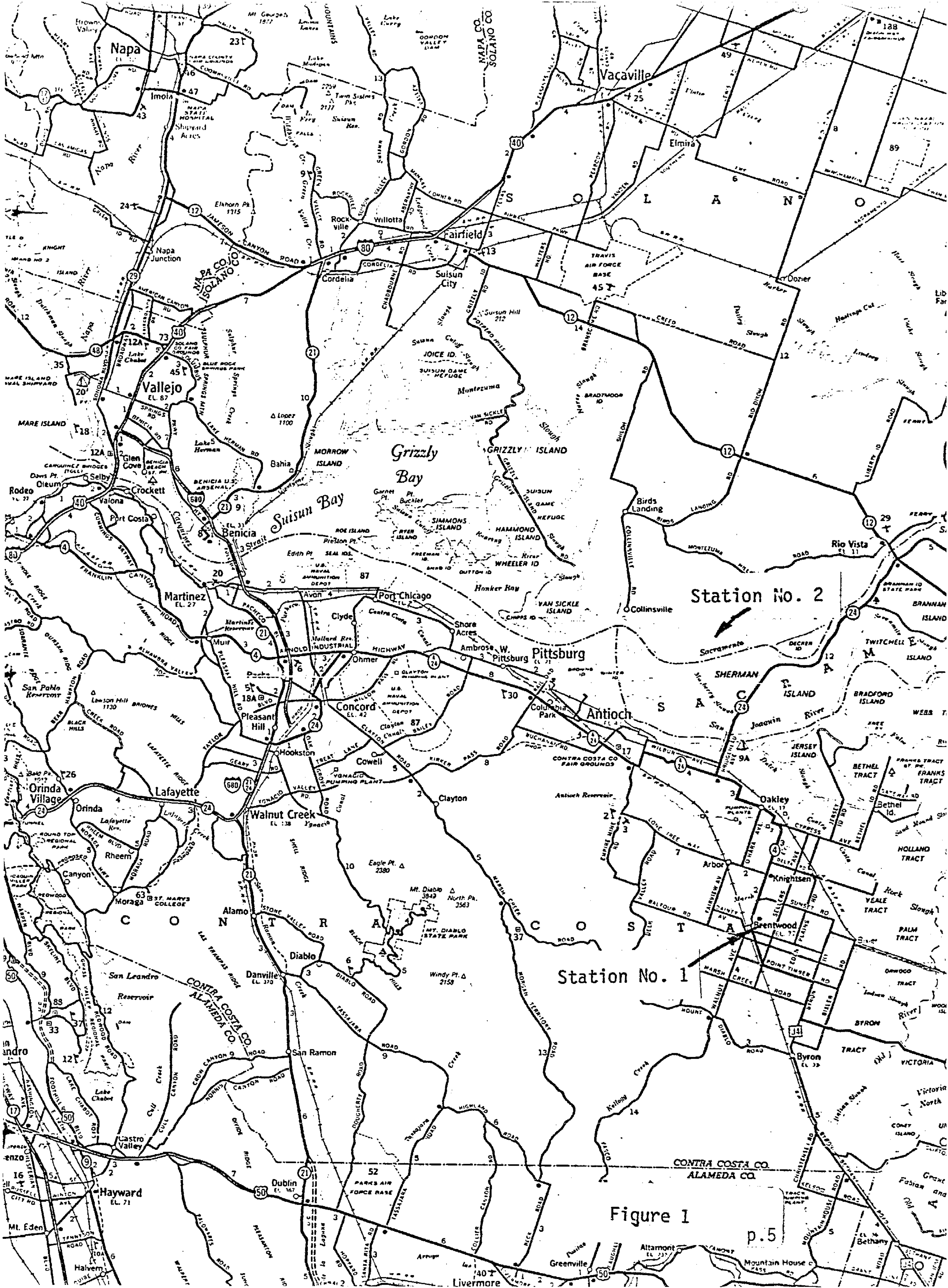

Station No. 2
Station No. 1
Napa
Vacaville
Elmira
Fairfield
Suisun City
Cordelia
Vallejo
Benicia
Crockett
Martinez
Port Chicago
Pittsburg
Antioch
Oakley
Brentwood
Knightsen
Byron
Concord
Clayton
Pleasant Hill
Walnut Creek
Lafayette
Orinda
Moraga
Alamo
Danville
Diablo
San Ramon
Castro Valley
Hayward
Dublin
Livermore
Rio Vista
Birds Landing
Collinsville
Grizzly Bay
Suisun Bay
Honker Bay
Sacramento River
San Joaquin River
SOLANO
CONTRA COSTA
CONTRA COSTA CO.
ALAMEDA CO.
NAPA CO.
SOLANO CO.

Figure 1

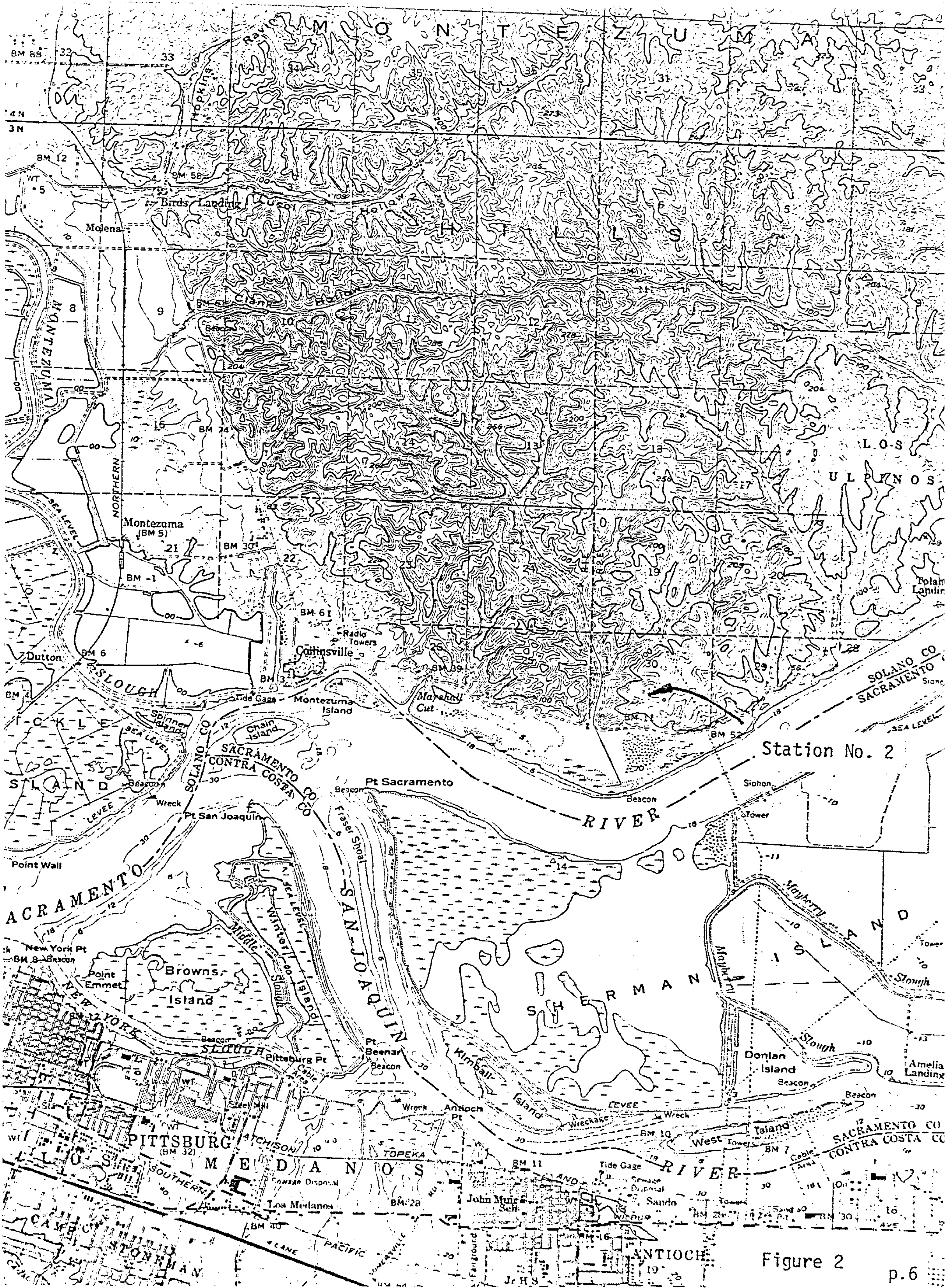

Station No. 2
MONTEZUMA HILLS
LOS ULPINOS
Montezuma
Collinsville
Birds Landing
Molena
Dutton
Montezuma Island
Chain Island
Spinner Island
Pt Sacramento
Pt San Joaquin
Point Wall
SACRAMENTO RIVER
SAN JOAQUIN
SHERMAN ISLAND
Mayberry Slough
Donlan Island
Browns Island
New York Pt
Point Emmet
NEW YORK SLOUGH
Pittsburg Pt
PITTSBURG
LOS MEDANOS
Antioch Pt
West Island
ANTIOCH
SOLANO CO
SACRAMENTO CO
CONTRA COSTA CO
Marshall Cut
Kimball Island

Figure 2

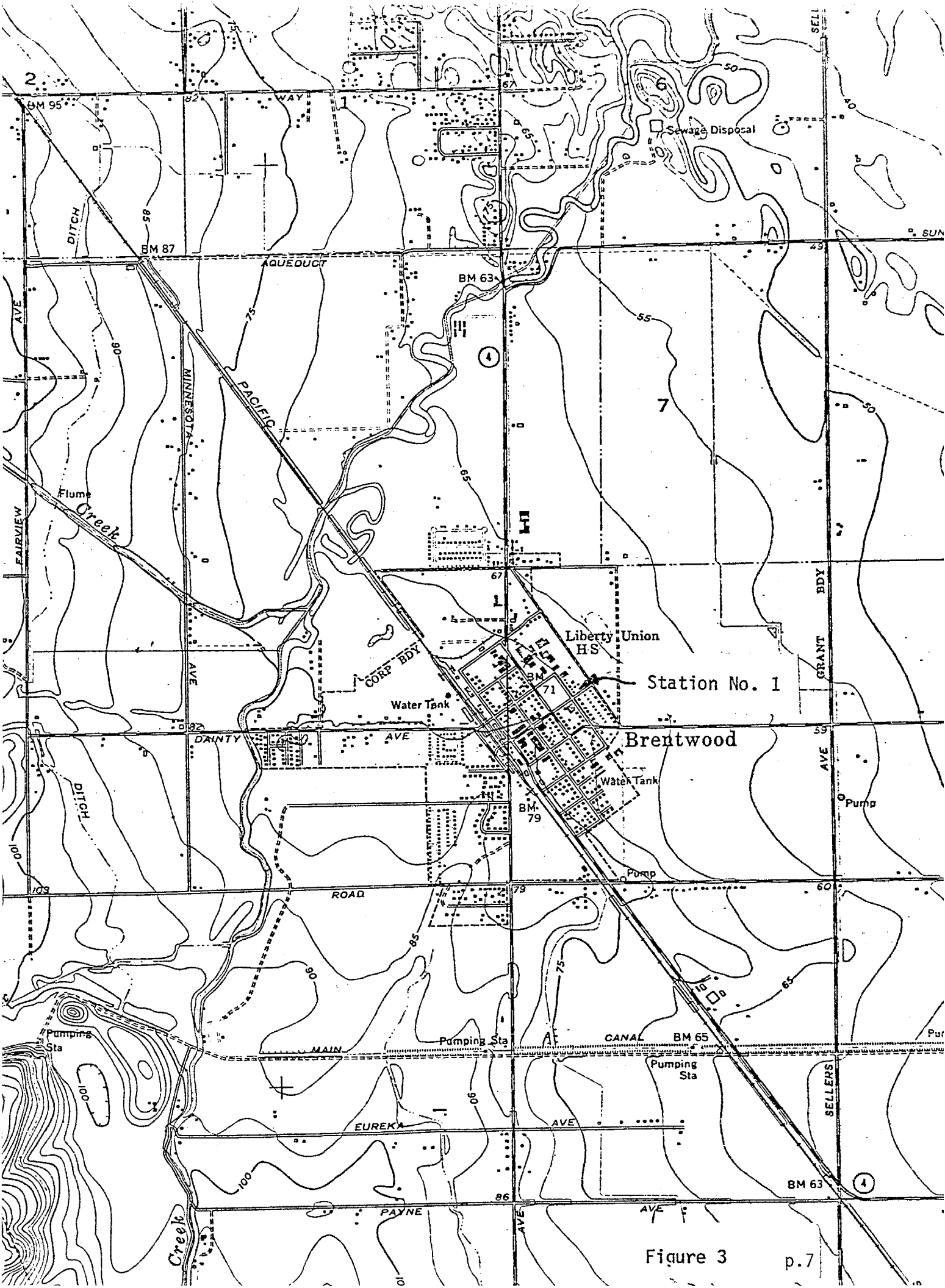
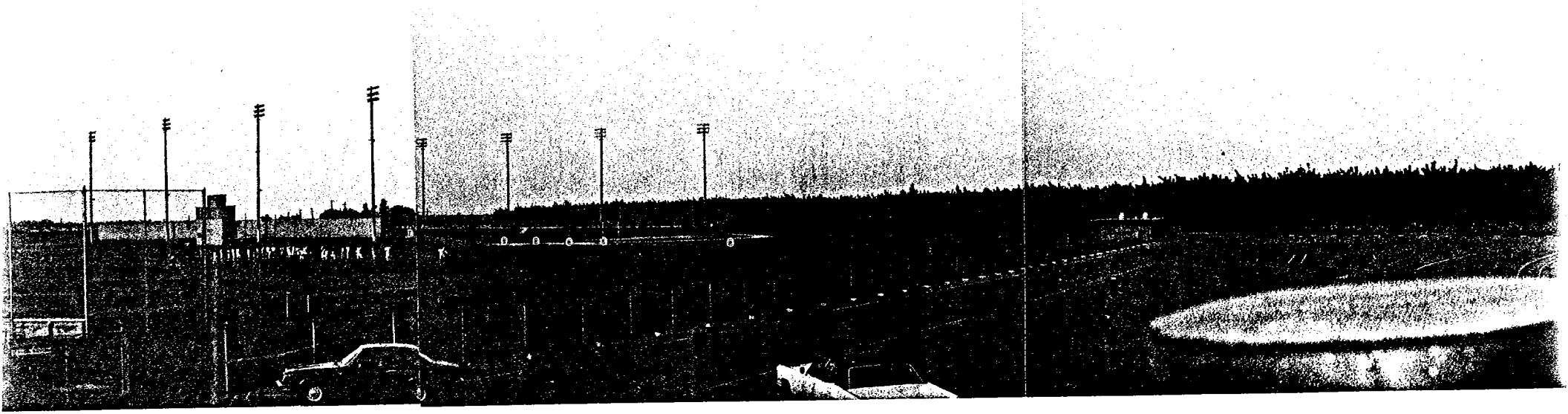

Sewage Disposal
BM 95
BM 87
BM 63
AQUEDUCT
DITCH
MINNESOTA AVE
PACIFIC
Flume
Creek
FAIRVIEW AVE
CORP BDY
Liberty Union H S
Station No. 1
BM 71
Water Tank
Brentwood
DAINTY AVE
BM 79
Water Tank
Pump
Pump
ROAD
Pumping Sta
MAIN
Pumping Sta
CANAL
BM 65
Pumping Sta
EUREKA AVE
PAYNE AVE
BM 63
SELLERS AVE
GRANT BDY

Figure 3 p.7



North

North
Northeast

Northeast

Figure 4 - Part A. View from the Sample Inlet of Station No. 1 in Brentwood, CA.

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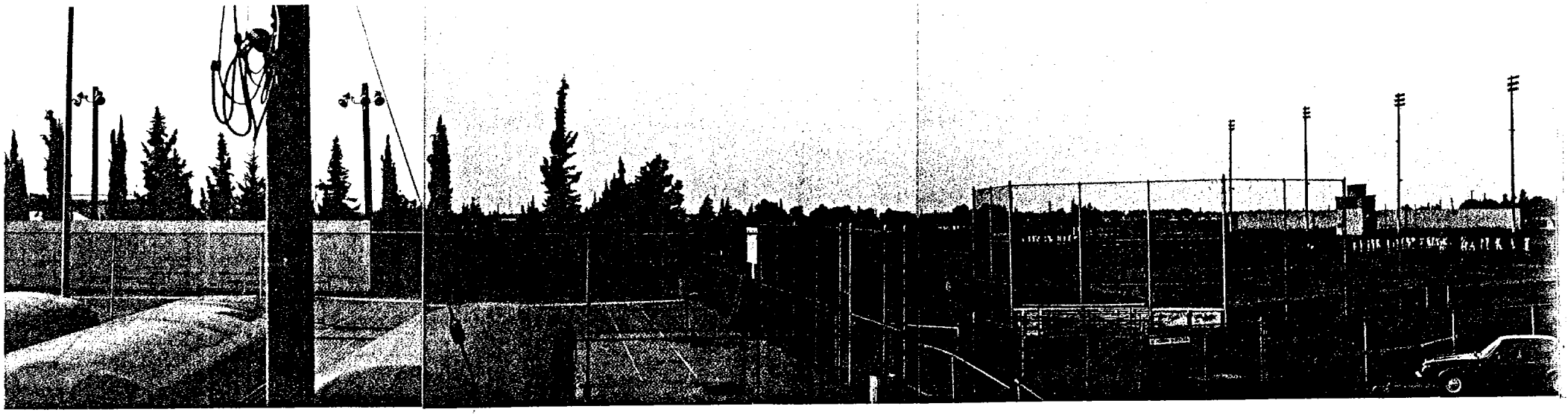

Northwest | North Northwest | North

Figure 4 - Part B. View from the Sample Inlet of Station No. 1 in Brentwood, CA.

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Air Monitoring Center

when the prevailing direction was west southwest, all days had a prevailing wind direction between northwest and north northeast. Also, 56% of the recorded wind directions were included in the headings between northwest-to-northeast. During the daytime, a higher fraction of the winds were from these directions. As can be seen from Figure 3, the monitoring site was on the northeast edge of town, so that emissions from automobiles on the city streets or other local sources in town have little or no influence on the data when the wind is from the prevailing direction.

It can also be seen in Figure 4 that school buses were parked close to the monitoring station. The northernmost bus that shows in Figure 4 was not used during the time period of this study, but those to the south were used on schooldays, which includes 30 August and all subsequent weekdays, except for Labor Day, 6 September. The first buses leave the lot at 7:00 a.m., and there were frequent arrivals and departures during the rest of the morning and early afternoon.

To minimize the impact of the buses on the data during the intensive study days late in the field program, arrangements were made with the Transportation Department of the high school to have the buses parked on the street to the south and east of the monitoring station during the day, so that the buses did not return to the parking lot until their last run of the day. This schedule was followed on Friday, 10 September and Tuesday, 14 September.

4.1 AUTOMATIC CALIBRATION SYSTEM

Both monitoring systems were equipped with a system which automatically calibrates the trace gas instrumentation once a day. A timer begins the calibration sequence shortly after midnight, and the calibration steps are as shown in Table 1. Span gases are obtained by dilution of gases from cylinders containing NO, SO_2, and a mixture of hydrocarbons. The gas titration procedure is used to span the NO_2 and ozone channels. All gas flows were measured by mass flowmeters and recorded by the data set along with status bits giving the valve positions, so any irregularity in the automatic calibration cycle was easily detected.

All data were reduced using the zero and span data obtained the previous

Table 1. Functions of the Automatic Calibration System

Start Time	Status Print Code	Calibration Operation
0001	56	Supply zero gas to the O_3, SO_2, and NO-NOx instruments
0016	59	Supply NO to span the NO and NO_x channels
0031	59	Turn on ozone lamp to convert some NO to NO_2 to span the NO_2 channel and check the converter efficiency
0046	62	Span the ozone instrument
0101	61	Span the SO_2 instrument
0131	55	Supply zero gas to the hydrocarbon instrument
0201	55	Span the hydrocarbon instrument
0231	63	All instruments sample from the sample manifold (normal operation)

night. In a few cases, the automatic calibration system did not cycle properly, so calibration constants were interpolated between the existing data.

4.2 AMC QUALITY ASSURANCE AUDITS

The Air Monitoring Center maintains a separate Quality Assurance group, which audits the performance of monitoring stations and other field and laboratory operations. On 26 and 27 August, a member of this group performed a quality assurance audit of the fixed monitoring system near Collinsville (Station 2). The audit of the mobile system in Brentwood (Station 1) was performed on 31 August, the day following the four days of unusually high ozone readings at this site. The findings of these audits are reported in the Appendix. Several minor problems with the hardware were called to the attention of the station operator, and were corrected.

4.3 ARB QUALITY ASSURANCE AUDIT

On 17 September 1976, the Air Resources Board conducted an audit of the

mobile monitoring station at Brentwood, California. A report of the results of this audit is contained in an ARB memorandum by Robert Maxwell to Don Crowe dated 6 October 1976.

The customary procedure in an ARB audit is to see how closely the instrumentation has been adjusted so that the response of each monitor agrees with the nominal response. In addition, it is the recommended procedure of the ARB to adjust each monitor as necessary to keep the actual response within 10% of the nominal response (R. Maxwell, private communication, 1977). In contrast, the philosophy used in the operation of the Dow mobile laboratory was to adjust the monitors only as often as required to keep the response linear and within roughly 20% of the nominal response, or as required to prepare the system for the acceptance test. The instrument voltages recorded during each day are converted to engineering units using data from the daily zero and span of each monitor. Minimizing the adjustment of the instruments makes it possible to obtain a record of the zero and span drift of each monitor.

The difference in operating philosophies has made difficult a comparison between the ARB audit data and the values reported by the station. In particular, the ARB audit report compared each instrument reading with the nominal reading, to see if the instrument had been adjusted so that the actual and nominal readings were within 10% of each other, but did not include a record of the instrument voltages recorded by the station data set during instrument calibration. Also, the ARB audit report did not include a comparison between the ARB audit data and the results recorded by the data set in the station. Carrying out this comparison requires obtaining the calibration constants currently in use for the reduction of the data.

To partly bridge this gap, a comparison is presented here between the ARB audit data and the station zero and span data. The ozone data are considered first. The left hand column in Table 2 gives the ozone concentration in the calibration flow as determined by a specially calibrated Dasibi instrument used by the ARB as a transfer standard. The next column gives the panel meter reading of the instrument being calibrated. Since the data from the instrument as recorded by the data set was not included in

Table 2

Ozone Calibration Data Comparison

Dow Station No. 1, Brentwood, CA
17 September 1976

Ozone Concentration ppm	Dow Instrument Reading ppm	Presumed Output Voltage V volts	Calculated Ozone Concentration ppm
0.0	0.0076	0.0152	-0.003
0.0805	0.0812	0.1624	0.073
0.2060	0.1921	0.3842	0.189
0.3672	0.3468	0.6936	0.350

Station Calibration Equation: ppm = 0.52 x V -0.011

the audit report, the next column of the table was calculated on the presumption that this voltage was twice the reading in ppm. We do not have data to support the accuracy of this presumption, and have not made an attempt to reconstruct such information. The right hand column gives the ozone concentration calculated from the presumed output voltage by means of the station calibration equation derived from the zero and span data.

Figure 5 shows the comparison between the station calibration and the ARB audit for the Monitor Labs Model 8440 NO-NO_x monitor. The crosses give the instrument calibration by the ARB for NO_2 based on the modified Saltzman method, and the solid lines give the station calibration. It can be seen that according to the ARB audit, if the instrument were measuring only NO_2, the reported value for NO_x would be quite accurate and the reported value for NO_2 would be low.

Figure 6 shows the comparison between the station calibration and the ARB audit for the Monitor Labs Model 8450 sulfur gas monitor. The crosses give the instrument calibration by the ARB for sulfur dioxide based on the pararosaniline method, and the solid line the station calibration. The two calibrations are in excellent agreement.

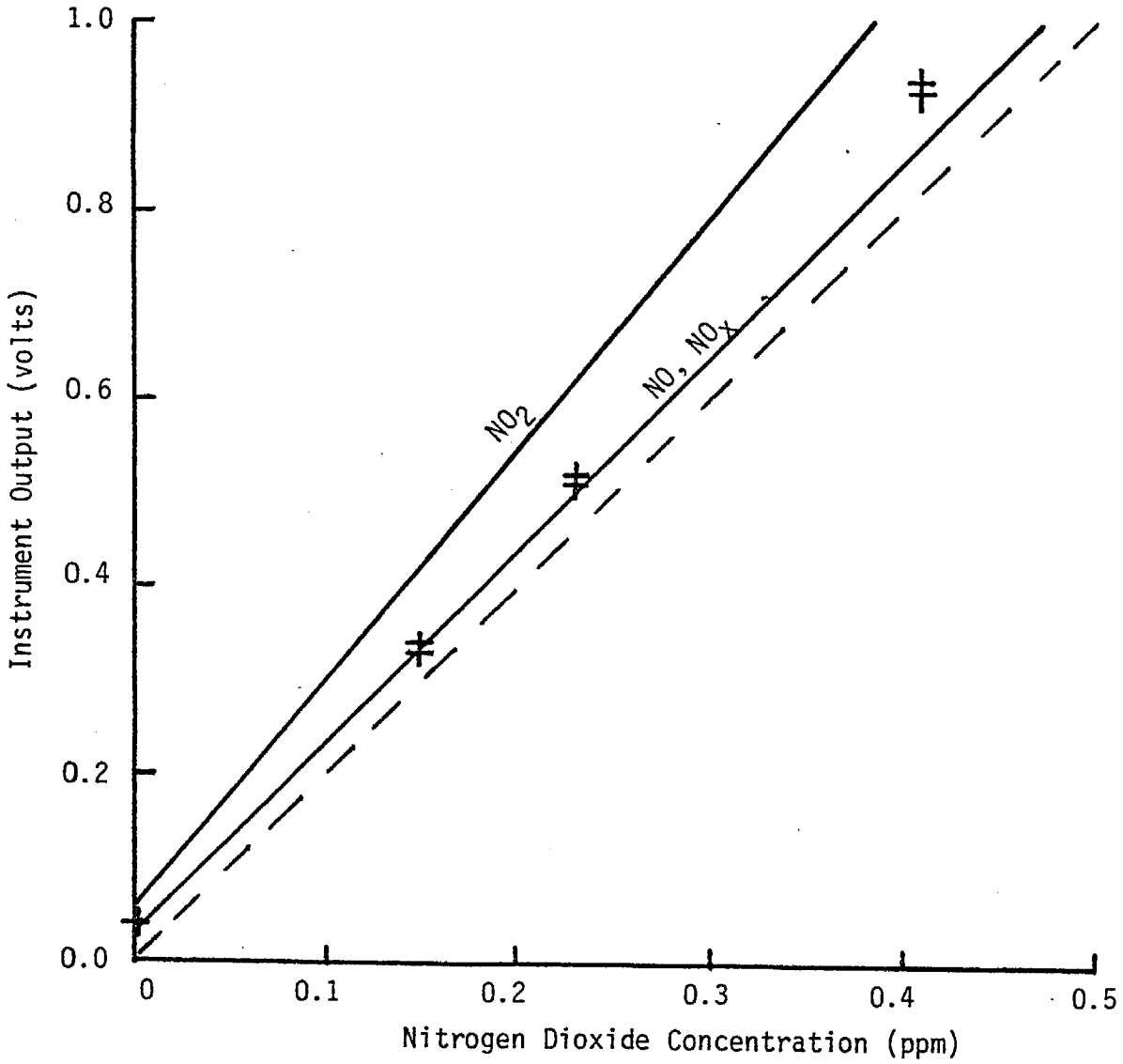

Figure 5. Nitrogen Dioxide Audit Results.

——— Station Zero and Span Data

\+ ARB Audit Results

- - - - Nominal Instrument Calibration

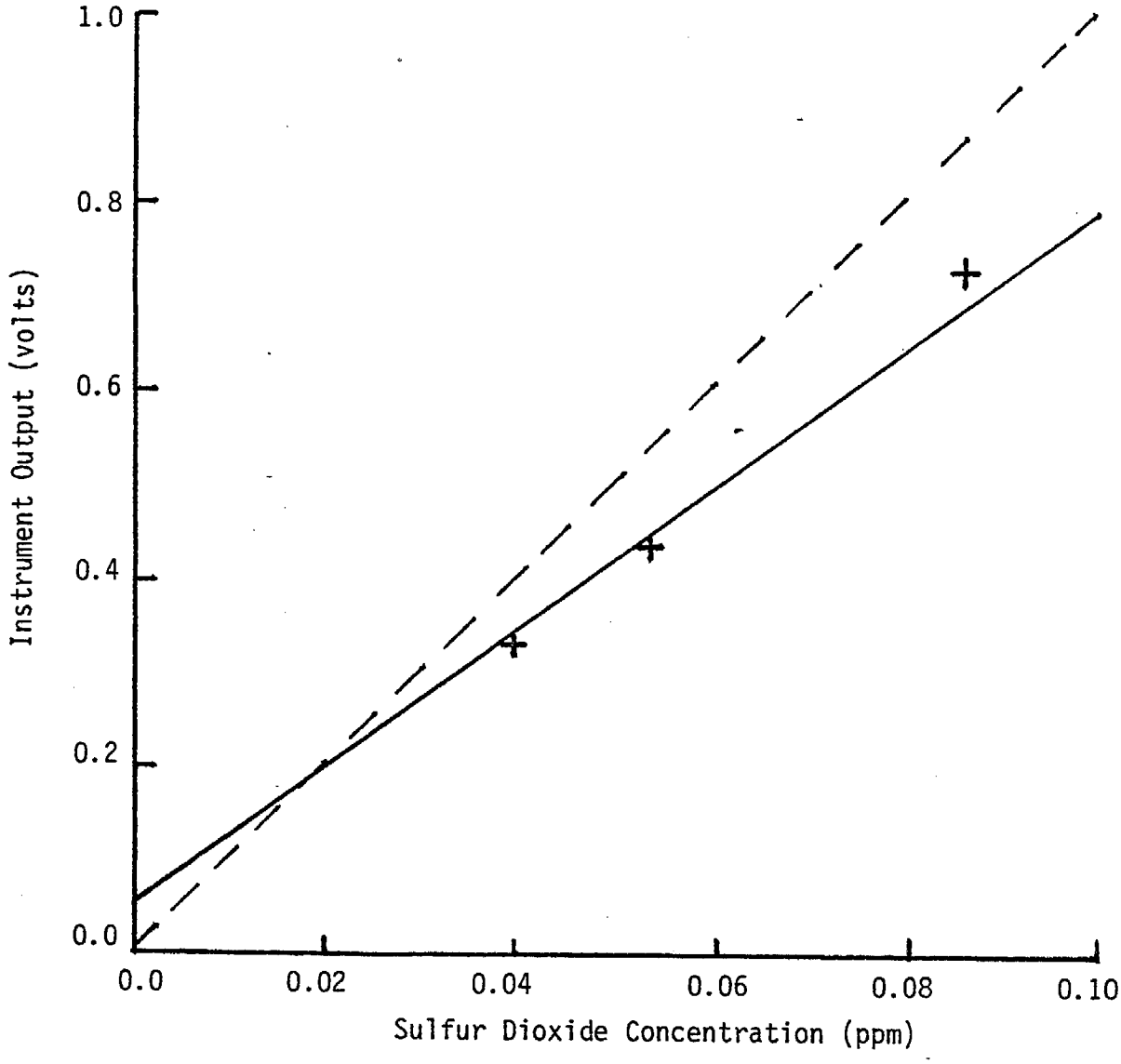

Figure 6. Sulfur Dioxide Audit Results.

——— Station Zero and Span Data

\+ ARB Audit Results

- - - - Nominal Instrument Calibration

5.0 THE DATA

The following tabulations give the one-hour average data calculated from the readings recorded at five-minute intervals on the monitoring station data tapes. The steps in reducing these data were:

1. Dump the station tape onto a magnetic disk and a printout of raw voltages.
2. Execute a program to search for and reduce the automatic calibration data to determine the instrument calibration constants for each day.
3. Manually review the calibration constants for correctness and consistency, and enter them into the data file.
4. Create a data output in engineering units.
5. Review the data and the logbooks to delete data recorded during station calibration, instrument service, instrument downtime, or other data known to be invalid.
6. Calculate the one-hour averages, wind roses, and produce the final data printouts.

Step 5 consumes a major portion of the data reduction effort. If there are six or more five-minute data points in a one-hour interval, a one-hour average is calculated and recorded. If there are fewer readings, the one-hour average is still calculated, but the decimal point is replaced by an asterisk.

5.1 THE DATA FROM STATION 1 IN BRENTWOOD, CALIFORNIA

Tables 3 through 5 summarize the wind data; Tables 6 and 7 give the hour-average temperature and relative humidity in percent; and Tables 8 through 12 give the hour-average trace gas concentrations. Both here and at Station 2, the hydrocarbon data were not reliable enough to report. Complete tabulations of the five-minute data points appear in a separate data volume.

Table 3. Summary of Wind Data - 30 August - 16 September, Station 1, Brentwood, CA.

AVERAGE WIND SPEED = 5.5 MI/HR

PREVAILING DIRECTION IS NNE

MI/HR	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
0.5/ 4.4	3.31	4.25	3.24	2.28	2.11	1.33	0.98	1.06	1.08	0.91	0.96	2.72	4.86	4.96	5.52	3.17
4.5/ 8.9	6.85	7.98	4.79	2.16	1.10	0.96	1.40	0.61	0.54	0.17	0.86	2.80	3.14	4.37	5.23	4.39
9.0/13.4	2.65	2.55	0.81	0.10	0.02	0.02	00.00	00.00	00.00	0.10	0.27	0.81	0.56	0.32	0.29	0.47
13./17.9	0.10	0.42	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.07	0.05	0.10	0.02	0.05	0.02
18.0/24.6	0.02	0.05	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.02	00.00	00.00	00.00	00.00
24.7/31.3	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
> /31.3	0.02	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00
TOTAL	12.96	15.24	8.83	4.54	3.24	2.31	2.38	1.67	1.62	1.18	2.16	6.40	8.66	9.67	11.09	8.05

TOTAL FREQUENCIES FOR EACH SPEED CLASS

MI/HR	PERCENT
0.5/ 4.4	42.72
4.5/ 8.9	47.34
9.0/13.4	8.98
13./17.9	0.83
18.0/24.6	0.10
24.7/31.3	00.00
> /31.3	0.02

00.00 PERCENT CALM

Table 4. Daily Wind Summary - Station 1, Brentwood, CA.

DAY	AVG SPEED (MPH)	PRVL DIR
30	5.8	NW
31	5.7	N
1	4.8	NNE
2	4.9	NNE
3	5.2	N
4	5.1	NNE
5	5.1	N
6	5.3	NNE
7	6.7	NNE
8	6.5	NNE
9	5.6	N
10	4.0	NE
11	****	***
12	5.2	NNW
13	3.8	NNE
14	7.9	WSW
15	6.4	WSW
16	4.2	NW

Table 5. Hourly Wind Speed Averages in MPH - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	2.8	2.6	2.5	2.0	4.4	5.5	4.4	4.3	4.6	7.7	7.0	8.0	8.0	7.4	8.3	7.8	6.7	6.3	6.0	6.7	6.4	5.6	6.0	5.6	24	5.8
31	5.0	4.7	3.8	2.9	4.2	3.8	2.6	4.4	4.4	4.7	6.5	7.6	8.1	7.0	6.7	7.7	9.6	10.7	9.2	6.8	5.6	3.8	3.0	3.1	24	5.7
01	2.9	3.2	2.3	2.6	2.5	3.3	3.1	3.7	5.0	3.5	4.0	5.6	5.2	7.4	7.2	7.6	9.1	10.4	7.4	3.8	3.6	3.3	2.8	4.0	24	4.7
02	2.9	5.3	3.9	3.3	2.8	5.0	4.1	4.0	3.9	4.1	4.6	5.7	5.3	5.8	6.7	9.8	8.9	6.8	7.4	5.1	2.8	3.3	3.7	3.6	24	4.9
03	3.4	6.8	5.6	3.1	1.8	1.9	3.0	2.4	4.9	4.8	3.9	3.5	5.9	7.0	8.9	10.0	8.9	8.3	7.0	5.2	3.1	3.8	5.7	4.9	24	5.2
04	5.7	5.1	3.9	3.5	3.5	4.1	4.1	3.1	4.2	4.6	4.1	3.8	5.8	7.1	6.7	8.4	5.2	5.8	7.3	5.6	4.5	3.8	5.0	8.5	24	5.1
05	4.8	5.0	5.4	3.5	4.3	4.0	3.3	3.6	3.7	4.9	4.3	5.5	7.2	6.7	6.3	5.2	5.5	5.3	6.6	4.9	5.4	3.9	4.2	8.5	24	5.1
06	8.0	4.7	3.7	4.2	5.5	3.2	3.3	3.5	4.0	4.0	4.1	4.8	6.2	6.6	6.8	6.9	7.5	9.9	8.1	4.2	6.7	5.1	3.4	3.9	24	5.3
07	3.5	3.9	5.2	4.5	6.3	6.4	7.0	5.5	8.0	14.5	13.0	10.1	9.5	10.5	9.0	7.6	6.8	5.8	5.3	2.8	3.3	3.7	4.7	4.2	24	6.7
08	3.4	5.1	4.7	4.6	5.7	5.2	4.4	4.5	7.6	9.5	13.2	11.6	9.9	8.8	10.2	9.5	6.7	6.2	4.3	2.8	3.4	4.5	5.1	5.5	24	6.5
09	5.9	3.3	3.5	4.9	2.5	2.8	3.2	5.4	7.2	7.8	7.0	6.8	6.6	7.1	8.7	7.4	8.5	8.3	7.0	4.5	4.1	3.4	2.9	5.4	24	5.6
10	4.4	4.7	3.6	3.6	3.5	3.7	3.7	3.4	2.6	3.6	4.8	4.4	3.1	3.5	5.3	6.4	5.7	4.2							18	4.1
11																									0	*****
12																	6.3	6.3	5.5	4.8	5.0	6.0	4.4	3.7	8	5.2
13	3.4	3.2	3.0	2.6	3.0	5.1	3.8	2.7	3.3	3.3	5.0	6.2	5.5												13	3.9
14												5.2	5.3	4.9	5.9	6.5	9.5	10.3	10.3	9.5	9.7	5.9	9.4	8.8	13	7.8
15	12.3	7.8	5.8	3.4	3.9	4.3	5.0	6.1	4.8	4.7	5.2	5.2	5.8	6.6	6.8	9.8	13.5	6.3	7.5	8.9	5.3	5.6	5.1	6.0	24	6.5
16	4.5	4.0	3.9	3.9	3.0	2.6	3.7	3.3	4.7	6.7	6.1														11	4.2
N	15	15	15	15	15	15	15	15	15	15	15	15	15	14	14	13	15	15	14	14	14	14	14	14		
MN	2.8	2.6	2.3	2.6	1.8	1.9	2.6	2.4	2.6	3.3	3.9	3.5	3.1	3.5	5.3	5.2	5.2	4.2	4.3	2.8	2.8	3.3	2.8	3.1		1.8
MX	12.3	7.8	5.8	4.9	6.3	6.4	7.0	6.1	8.0	14.5	13.2	11.6	9.9	10.5	10.2	10.0	13.5	10.7	10.3	9.5	9.7	6.0	9.4	8.8		14.5
ME	4.9	4.6	4.1	3.6	3.8	4.1	3.9	4.0	4.9	5.9	6.2	6.3	6.5	6.9	7.4	7.8	7.9	7.3	7.1	5.4	4.9	4.4	4.7	5.4		5.5

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Table 6. Hourly Temperature Averages in Centigrade - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	26.5	26.0	25.0	22.5	21.4	21.9	21.5	20.8	23.9	28.2	29.7	31.6	33.8	36.1	36.8	38.0	38.5	38.6	38.9	36.8	33.3	31.4	30.0	29.8	24	30.0
31	29.2	30.1	24.5	23.2	21.8	21.6	20.1	20.7	24.0	26.7	30.4	33.1	34.3	36.0	37.8	38.6	39.0	38.1	37.1	35.0	32.6	30.7	28.0	25.8	24	29.9
01	24.4	23.9	22.0	21.3	20.4	19.2	18.7	19.8	22.2	25.4	28.2	31.3	33.9	35.4	36.4	37.3	37.8	37.7	36.2	32.3	30.7	26.9	24.8	23.2	24	27.9
02	22.4	19.6	18.6	18.5	18.5	18.0	18.2	19.3	21.2	24.4	27.5	28.6	30.6	32.8	34.1	34.9	35.2	35.9	35.7	32.8	30.4	28.4	26.9	26.6	24	26.6
03	24.8	18.9	18.3	18.8	17.5	17.2	16.6	16.7	18.6	20.8	23.4	25.7	28.0	29.5	29.8	30.8	32.8	33.9	33.1	30.7	28.7	26.7	22.0	19.6	24	24.3
04	19.1	18.2	17.9	17.2	16.6	15.9	15.9	16.0	18.3	21.0	24.4	27.9	29.9	30.0	31.1	32.1	31.3	31.6	30.4	28.8	28.1	28.3	25.2	22.7	24	24.1
05	22.9	21.5	20.9	20.9	20.2	19.7	19.2	19.2	20.3	22.6	24.6	26.2	26.9	28.8	30.5	32.1	32.3	32.5	33.0	30.4	27.3	25.6	24.2	23.4	24	25.2
06	22.7	21.8	19.9	19.7	19.8	19.4	19.4	17.6	19.0	21.7	23.6	25.0	26.8	27.9	28.9	30.0	30.6	30.3	29.3	28.4	27.1	25.0	22.0	21.0	24	24.0
07	20.8	19.6	19.5	19.5	20.8	22.3	21.9	21.8	24.0	25.3	26.7	28.3	29.7	30.8	32.1	33.1	33.8	33.7	33.2	31.9	29.4	27.3	26.3	25.9	24	26.6
08	24.8	24.6	23.7	22.5	25.2	25.4	25.2	25.8	27.3	28.0	28.8	31.1	32.5	33.8	34.8	35.6	36.0	36.1	35.2	33.2	31.1	28.7	27.4	27.9	24	29.4
09	27.8	26.6	25.7	24.7	22.2	21.8	21.1	22.2	26.1	27.5	29.7	31.7	33.6	35.1	36.2	36.8	37.4	37.3	37.2	34.7	33.0	32.0	29.9	30.2	24	30.0
10	30.3	26.0	25.1	23.6	23.7	24.1	24.4	22.9	23.4	25.0	25.7	26.4	26.9	27.9	28.8	29.1	28.8	27.5	27.7	27.2	26.1	25.8	25.6	23.7	24	26.1
11	22.3	22.4	21.6	20.9	20.8	20.9	21.2	20.9	20.4	19.8	19.9	20.2	21.0	21.9	22.5	22.2	22.6	22.7	22.2	21.4	20.9	19.9	19.0	17.9	24	21.1
12	17.7	17.3	17.3	17.7	17.6	17.5	17.6	17.7	18.2	19.4	20.6	22.2	23.5	24.3	25.1	25.8	26.3	26.7	26.3	25.6	23.8	22.2	21.1	20.0	24	21.3
13	19.9	19.9	18.9	18.0	17.6	16.2	16.6	16.9	18.6	21.6	24.2	25.5	26.5												13	20.0
14												26.6	28.1	29.0	30.6	31.6	31.2	29.9	27.1	23.8	22.5	21.0	20.3	19.5	13	26.3
15	18.6	18.0	18.0	18.0	17.5	17.4	17.2	17.8	19.5	21.5	22.7	24.0	24.5	25.1	25.2	25*3	32.5	24.6	23.3	21.3	20.2	19.1	18.5	18.2	24	21.2
16	18.1	17.5	16.8	16.5	16.3	15.6	14.9	16.7	16.7	18.5	20.1														11	17.1
N	17	17	17	17	17	17	17	17	17	17	17	17	17	16	16	15	16	16	16	16	16	16	16	16		
MN	17.7	17.3	16.8	16.5	16.3	15.6	14.9	16.0	16.7	18.5	19.9	20.2	21.0	21.9	22.5	22.2	22.6	22.7	22.2	21.3	20.2	19.1	18.5	17.9		14.9
MX	30.3	30.1	25.7	24.7	25.2	25.4	25.2	25.8	27.3	28.2	30.4	33.1	34.3	36.1	37.8	38.6	39.0	38.6	38.9	36.8	33.3	32.0	30.0	30.2		39.0
ME	23.0	21.8	20.8	20.2	19.9	19.6	19.4	19.6	21.3	23.4	25.3	27.4	28.9	30.3	31.3	32.5	32.9	32.3	31.6	29.7	27.8	26.2	24.4	23.5		25.5

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Table 7. Hourly Relative Humidity Averages in Percent - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	33.9	31.8	34.0	44.9	56.1	45.4	47.0	65.4	53.9	35.4	30.2	29.3	26.8	21.8	24.2	22.1	22.3	22.2	17.7	16.5	21.2	23.7	24.5	23.0	24	32.2
31	24.6	23.1	37.5	44.2	52.5	52.0	56.9	61.6	52.4	50.6	34.8	25.4	24.8	23.1	19.3	16.0	17.1	17.2	20.8	25.2	23.1	22.8	23.3	30.2	24	32.4
01	36.7	49.0	54.1	54.3	57.6	66.8	64.4	60.4	60.4	52.6	47.7	37.1	27.9	24.1	24.3	21.9	23.1	25.5	27.7	36.2	30.3	43.0	50.2	51.8	24	42.8
02	51.1	65.8	73.5	73.9	70.8	68.1	68.0	62.4	67.5	58.6	44.0	46.0	41.9	36.0	31.9	31.0	31.6	29.3	18.3	23.2	27.2	31.4	35.8	32.3	24	46.7
03	38.3	65.5	65.5	63.2	67.9	67.8	68.0	67.1	62.8	59.8	50.9	46.5	44.1	39.5	34.7	35.6	30.0	19.9	22.3	28.9	30.5	35.6	53.6	64.4	24	48.4
04	62.4	64.5	67.7	69.8	68.4	67.4	68.0	68.4	66.7	60.0	48.7	35.8	34.8	37.8	36.6	35.8	37.2	37.1	37.2	34.8	31.7	33.0	43.2	55.9	24	50.1
05	58.4	58.7	52.3	55.2	59.1	59.2	62.8	67.8	63.8	56.3	52.0	49.0	48.1	41.7	36.6	32.1	33.1	29.2	18.5	22.8	31.8	36.9	39.0	38.8	24	45.3
06	45.0	52.2	55.9	55.6	53.9	57.5	56.6	64.5	64.9	56.4	50.8	48.7	45.9	42.2	40.5	38.2	36.4	34.6	35.1	32.1	27.4	28.6	47.2	50.9	24	46.7
07	58.0	49.4	56.8	49.7	41.9	29.8	27.9	33.4	27.5	25.9	24.2	23.2	23.2	22.8	24.4	22.7	21.0	23.0	23.1	23.8	26.9	25.6	25.5	26.1	24	30.3
08	28.3	27.7	28.8	34.8	25.4	23.6	24.1	23.8	22.6	22.4	23.5	20.9	18.5	18.0	18.9	18.8	19.3	18.0	21.1	24.7	26.7	24.5	23.2	20.8	24	23.3
09	21.3	22.8	24.9	27.7	36.0	42.6	38.1	36.0	34.6	30.8	27.9	26.4	25.4	23.0	21.7	21.2	15.3	14.4	13.5	15.5	15.0	17.1	20.4	17.4	24	24.5
10	16.6	34.2	39.5	42.5	42.0	40.2	35.5	47.4	55.9	52.0	53.6	52.7	48.6	40.2	36.5	33.6	31.7	37.0	34.1	24.5	30.6	29.6	29.5	41.1	24	38.7
11	53.9	54.0	60.8	63.2	73.5	74.9	72.0	62.0	58.8	60.6	72.0	72.3	66.6	60.9	59.8	60.7	58.7	58.5	56.4	56.6	53.1	54.7	55.8	57.0	24	61.9
12	57.4	56.5	58.5	58.4	58.0	59.2	58.6	57.7	56.8	56.4	55.5	52.9	51.4	49.4	46.4	46.2	42.5	39.4	39.7	38.8	44.2	48.9	51.9	52.0	24	51.6
13	51.9	52.7	56.4	59.2	60.8	69.6	67.4	65.1	65.6	57.7	50.4	49.2	45.6												13	57.8
14												32.0	32.9	31.8	28.9	25.6	31.5	35.0	41.5	49.1	48.5	52.4	54.8	55.1	13	39.9
15	57.1	56.3	54.5	53.6	55.2	55.8	56.1	53.8	52.0	47.1	41.2	37.9	36.3	36.8	37.1	37*3	42.9	39.2	41.5	45.9	48.4	52.2	54.8	55.4	24	47.9
16	56.0	58.6	60.4	60.3	59.9	62.8	63.4	58.5	63.3	58.7	53.4														11	59.6
N	17	17	17	17	17	17	17	17	17	17	17	17	17	17	16	16	15	16	16	16	16	16	16	16		
MI	16.6	22.8	24.9	27.7	25.4	23.6	24.1	23.8	22.6	22.4	23.5	20.9	18.5	18.0	18.9	16.0	15.3	14.4	13.5	15.5	15.0	17.1	20.4	17.4		13.5
MX	62.4	65.8	73.5	73.9	73.5	74.9	72.0	68.4	67.5	68.6	72.0	72.3	66.6	60.9	59.8	60.7	58.7	58.5	56.4	56.6	53.1	54.7	55.8	64.4		74.9
ME	43.2	48.0	51.8	53.6	55.2	55.5	55.0	56.2	54.7	50.0	44.8	40.3	37.8	34.3	32.6	30.8	30.9	30.0	29.3	31.1	32.3	35.0	39.5	42.0		42.2

Table 8. Hourly SO_2 Averages in ppm - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																							
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	.001	.001	-.001	-.001	.004	.001	.000	.009	.010	.019	.029	.031	.019	.007	-.002	-.003	-.003	-.002	.003	.002	.007	.004	-.001	-.002	24	.005
31	-.001	.000	-.001	-.001	.002	.005	.003	.008	.016	.016	.015	.042	.068	.033	.036			.020	.007	.003	.004	-.001	-.001	-.001	.000	23	.012
01	.003	.009	.004	.004	.002	.005	.005	.008	.018	.016	.014	.006	.032	.015	.004	.008			.002	-.002	.002	-.010	-.007	-.004	-.002	23	.006
02	.012	.015	.007	.004	.003	.005	.008	.010	.012	.007	.008	.019	.019	.011	.007	.012	.011	.009	.000	.000	.001	.001	.001	.000	24	.008
03	.001	.002	-.001	-.001	-.001	-.001	.000	.003	.010	.006	.005	.003	.010	.013	.017	.013	.014	.006	-.001	-.001	-.001	-.001	.000	.009	24	.005
04	.014	.015	.014	.008	.007	-.002	.008	.005	.007	.006	-.000	-.000	.004	.013	.014	.014	.010	.006	-.001	-.002	-.003	-.003	-.003	.002	24	.006
05	.008	.015	.019	.020	.020	.013	.009	.007	.010	.010	.012	.013	.016	.014	.015	.015	.013	.005	-.002	-.002	-.003	-.003	-.003	-.003	24	.009
06	-.002	-.001	-.002	-.002	-.002	-.002	-.002	-.001	-.002	-.002	-.002	-.002	-.001												13	-.002
07														-.007	-.008	-.007	-.005	-.005	-.005	-.006	-.006	-.005	-.004	-.003	-.002	.006	13	-.004
08	.004	.005	.004	.010	.006	.002	.000	.001	-.000	-.002	-.005	-.005	-.005					.000	-.000	-.000	-.001	.000	.001	.002	.004	.009	22	.001
09	.006	.004	.000	-.001	-.001	.001	.001	.006	.012	.005	-.001	-.004	-.006	-.005	-.005	-.003	.003	.006	-.001	-.002	-.002	-.002	-.002	-.002	24	.000
10	-.001	.001	.000	.001	.001	.003	.005	.008	.007	.015	.005	.008	.008	.008	.010	.012	.007	.005	.004	.002	.015	.010	.000	.002	24	.005
11	.014	.017	.005	.005	-.007	-.008	-.008	-.005	-.006	-.007	-.007	-.007	-.006	-.006	.000	-.004	-.005	-.005	-.002	-.000	-.002	-.002	-.003	-.003	24	-.002
12	-.002	-.001	-.003	-.004	-.004	-.004	-.003	-.003	-.003	-.003	-.003	-.004	-.004	-.004	-.004	-.005	-.004	-.003	-.003	-.002	.000	.006	.002	-.001	24	-.003
13	-.003	-.002	-.004	-.004	-.005	-.004	-.003	-.002	-.003	-.001	.003	.003	-.002												13	-.002
14														-.001	-.001	-.003	-.004	-.005	-.007	-.008	-.007	-.007	-.007	-.007	-.006	13	-.005
15	-.004	-.002	-.005	-.005	-.005	-.005	-.005	-.004	-.004	-.005	-.004	-.002	-.002	-.003	-.004	*005	.014	-.004	-.004	-.003	-.003	-.003	-.004	-.004	24	-.003
16	-.003	-.001	-.003	-.004	-.003	-.002	-.001	-.001	-.002	-.002	-.003														11	-.002
N	16	16	16	16	16	16	16	16	16	16	16	17	17	14	14	13	14	15	15	15	15	15	15	15		
MN	-.004	-.002	-.005	-.005	-.007	-.008	-.008	-.005	-.006	-.007	-.007	-.007	-.008	-.007	-.005	-.005	-.007	-.008	-.007	-.007	-.010	-.007	-.007	-.006		-.010
MX	.014	.017	.019	.020	.020	.013	.009	.010	.018	.019	.029	.042	.068	.033	.036	.015	.020	.009	.004	.004	.015	.010	.008	.009		.068
ME	.003	.005	.002	.002	.001	.001	.001	.003	.005	.005	.003	.005	.008	.006	.005	.004	.005	.001	-.001	-.001	-.001	-.001	-.001	.000		.003

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Table 9. Hourly O_3 Averages in ppm - Aug-Sept, 1976 - Station 1, Brentwood, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30*	.046	.027	.077	.025	-.001	.013	.005	.008	.042	.097	.141	.148	.211	.258	.309	.298	.311	.301	.263	.245	.130	.085	.123	.182	24 .139
31	.197	.239	.143	.080	.018	.007	.004	.010	.042	.063	.099					.077	.098	.100	.072	.075	.048	.013	.002	-.002	20 .069
01	-.003	.005	-.003	-.004	-.003	-.004	-.002	-.001	.002	.010	.023	.042	.039	.063	.097	.085	.103	.094	.067	.025	.022	.009	-.003	-.003	24 .028
02	-.001	-.000	.000	-.002	-.002	.001	.005	.001	.009	.026	.061	.066	.097	.134	.153	.125	.103	.104	.089	.051	.018	.014	.009	.032	24 .046
03	.026	.001	.002	.003	.003	.005	.002	.002	.019	.029	.052	.076	.070	.095	.096	.104	.097	.090	.086	.065	.030	.046	.005	.000	24 .042
04	.004	.004	-.001	.000	.004	.000	.000	.002	.015	.022	.049	.081	.093	.074	.108	.101	.083	.069	.051	.038	.028	.034	.011	.002	24 .036
05	.003	.011	.005	.001	.000	.001	.002	.004	.019	.037	.058	.068	.065	.077	.108	.130	.095	.074	.048	.035	.031	.021	.007	.018	24 .038
06	.018	.009	.002	.003	.006	.004	-.000	.001	.006	.025	.037	.042	.048	.055	.068	.081	.078	.054	.043	.022	.022	.026	.002	-.001	24 .027
07	.029	.001	.002	.000	.006	.012	.021	.006	.020	.024	.028	.033	.039	.047	.056	.060	.059	.053	.050	.027	.004	.007	.014	.007	24 .025
08	.007	.017	.013	.007	.011	.007	.004	.004	.017	.023	.029	.034	.038	.043	.052	.059	.056	.052	.044	.021	.002	.005	.010	.022	24 .024
09	.035	.021	.019	.032	.017	.006	.002	.006	.017	.040	.047	.058	.075	.083	.077	.067	.058	.081	.099	.079	.040	.015	.017	.021	24 .042
10	.035	.010	.006	.002	.002	.003	.001	.002	.009	.009	.015	.020	.028	.034	.043	.039	.036	.035	.030	.007	.001	.003	.008	.005	24 .016
11	-.000	.001	.002	.003	.027	.023	.020	.018	.024	.022	.023	.023	.027	.033	.035	.044	.044	.047	.042	.020	.017	.021	.018	.021	24 .023
12	.024	.030	.023	.027	.030	.027	.024	.025	.027	.032	.045	.050	.055	.063	.075	.076	.082	.095	.080	.073	.043	.014	.018	.013	24 .044
13	.010	.022	.016	.009	.012	.007	.003	.003	.013	.030	.029	.062	.082												13 .023
14												.038	.047	.046	.064	.076	.052	.032	.020	.016	.015	.019	.023	.027	13 .036
15	.028	.023	.024	.024	.021	.019	.015	.008	.016	.028	.032	.034	.039	.039	.044	*041	.109	.038	.025	.021	.018	.015	.019	.014	24 .029
16	.013	.012	.010	.012	.011	.003	.008	.006	.007	.022	.026														11 .012
N	17	17	17	17	17	17	17	17	17	17	17	16	16	15	15	15	16	16	16	16	16	16	16	16	
MN	-.003	-.000	-.003	-.004	-.003	-.004	-.002	-.001	.002	.009	.015	.020	.027	.033	.035	.039	.036	.032	.020	.007	.001	.003	-.003	-.003	-.004
MX	.197	.239	.143	.080	.030	.027	.024	.025	.042	.097	.141	.148	.211	.258	.309	.298	.311	.301	.263	.245	.130	.085	.123	.182	.311
ME	.028	.026	.020	.013	.010	.008	.007	.006	.018	.032	.046	.055	.066	.076	.092	.095	.092	.082	.069	.051	.029	.022	.018	.022	.041

*The data for 30 August were obtained before the calibration of the ozone monitor had been verified, and therefore contain some uncertainty.

Table 10. Hourly NO Averages in ppm - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	-.002	-.001	-.003	-.003	.008	-.001	.009	.028	.025	.013	.015	.013	.009	.008	.008	.008	.009	.010	.009	.007	.003	-.001	-.007	-.001	24 .007
31	-.006	-.009	-.008	-.010	-.008	-.006	.039	.031	.026	.023	.013	.018	.025	.048		.014	.014	.012	.011	.009	.000	.002	-.021	.001	23 .009
01	.062	.070	.092	.075	.078	.090	.165	.153	.104	.098	.083	.069	.079	.070			.000	-.002	-.001	-.004	-.010	-.009	-.013	.023	22 .057
02	.041	.043	.029	.018	.036	.040	.044	.045	.024	.018	.009	.016	.015	.017	.018	.020	.021	.021	.019	.017	.007	-.023	-.020	-.040	24 .018
03	.003	.007	.002	.006	.007	.007	.025	.041	.018	.012	.006	.005	.007	.004	.003	.001	.003	.002	.001	-.000	.000	-.000	.012	.015	24 .008
04	.007	.002	.013	.012	.002	.012	.012	.020	.019	.015	.009	.002	.002	.005	.002	.003	.002	.002	.000	-.001	-.001	-.000	.004	.000	24 .006
05	.001	.001	.002	.001	.007	.005	.004	.011	.010	.007	.007	.005	.006	.005	.003	.001	.001	.001	.001	-.001	-.001	-.001	.000	-.001	24 .003
06	.002	-.000	.001	.001	.001	.001	.002	.008	.007	.003	.001	.000	.002	.002	.003	.002	.002	.001	.000	-.000	.001	-.001	.001	.005	24 .002
07																		.001	-.002	.003	.024	.003	.001	.004	7 .005
08	.001	-.000	.002	.003	.002	.004	.025	.071	.005	.001	.001	-.000	-.001		.162	.219	-.002	-.002	-.001	.017	.038	.006	-.000	-.001	23 .024
09	.000	-.000	-.001	-.001	-.001	.012	.040	.023	.019	.003	.001	-.000	-.000	.000	-.000	.000	.001	-.000	-.000	-.001	-.000	.003	.001	.000	24 .004
10	-.003	-.003	-.003	-.002	.000	.007	.012	.017	.011	.015	.012	.007	.001	-.000	.000	.001	-.000	-.003	-.003	.002	.007	.006	-.001	-.000	24 .003
11	.003	.008	.009	.004	-.001	-.001	-.001	-.001	-.000	.004	-.001	-.000	.001	.000	-.000	.000	-.001	-.001	-.001	-.001	-.001	-.001	-.001	-.001	24 .001
12	.000	-.000	.000	-.001	-.001	-.001	-.001	-.001	-.000	-.000	-.000	-.000	-.001	-.001	-.001	-.001	.000	-.001	-.001	-.002	-.002	-.001	.000	.001	24 -.001
13	.002	-.000	-.001	-.001	-.001	-.001	.010	.039	.013	.005	.013	.002	-.000												13 .006
14												.003	.001	.003	.000	-.001	.001	.002	.003	.004	.001	-.001	.001	-.001	13 .001
15	-.000	.001	-.000	-.001	-.000	-.000	.001	.015	.006	.001	.001	.003	.002	.001	.000	-*000	.069	.002	.002	.001	.002	.002	-.000	.001	24 .005
16	.001	.001	-.000	.000	-.001	.003	.022	.019	.016	.002	.001														11 .006
N	16	16	16	16	16	16	16	16	16	16	16	16	16	14	13	13	15	16	16	16	16	16	16	16	
MI	-.006	-.009	-.008	-.010	-.008	-.006	-.001	-.001	-.000	-.000	-.001	-.001	-.001	-.001	-.001	-.001	-.002	-.003	-.003	-.004	-.010	-.023	-.021	-.040	-.040
MX	.062	.070	.092	.075	.078	.090	.165	.153	.104	.098	.083	.069	.079	.070	.162	.219	.069	.021	.019	.017	.038	.006	.012	.023	.219
ME	.007	.007	.008	.006	.008	.011	.026	.032	.019	.014	.011	.009	.009	.012	.015	.021	.008	.003	.002	.003	.004	-.001	-.003	.000	.010

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Table 11. Hourly NO_2 Averages in ppm - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30																									0 ****
31																									0 ****
01																	.006	.025	.026	.042	.039	.039	.055	.061	8 .036
02	.032	.039	.039	.047	.029	.032	.030	.033	.043	.021	.007	.015	.014	-.002	-.006	-.007	-.008	-.008	-.015	-.002	.029	.074	.089	.085	24 .025
03	.027	.038	.028	.028	.022	.021	.018	.018	.029	.023	.024	.028	.033	.033	.041	.035	.038	.020	.009	.019	.033	.024	.051	.040	24 .028
04	.034	.039	.039	.036	.029	.027	.026	.025	.027	.027	.027	.021	.022	.036	.031	.029	.023	.016	.016	.023	.020	.013	.023	.032	24 .027
05	.035	.039	.043	.045	.044	.039	.035	.030	.025	.023	.024	.029	.030	.032	.027	.019	.022	.014	.012	.011	.010	.011	.015	.003	24 .026
06	.007	.012	.015	.013	.011	.013	.016	.012	.009	.004	.003	.004	.005	.009	.013	.016	.015	.013	.017	.024	.015	.009	.025	.029	24 .013
07																		.002	.001	.021	.038	.030	.023	.028	7 .020
08	.020	.016	.016	.025	.020	.020	.022	.027	.011	.005	.004	.003	.002			.003	.001	.001	.003	.028	.048	.034	.039	.028	22 .017
09	.018	.024	.023	.007	.012	.022	.027	.030	.035	.018	.007	.006	.004	.007	.004	.009	.020	.018	.016	.015	.018	.027	.019	.015	24 .017
10	.006	.016	.017	.019	.021	.023	.023	.024	.029	.034	.034	.021	.019	.018	.024	.036	.032	.028	.028	.032	.039	.032	.022	.024	24 .025
11	.021	.031	.025	.023	.003	.004	.005	.009	.006	.009	.006	.007	.006	.005	.005	.004	.004	.004	.007	.015	.015	.013	.010	.008	24 .010
12	.010	.008	.012	.007	.006	.007	.008	.011	.007	.005	.005	.003	.002	.003	.002	.002	.011	.010	.011	.020	.022	.032	.026	.026	24 .011
13	.022	.018	.015	.017	.014	.014	.019	.020	.017	.015	.025	.014	.010												13 .017
14												.010	.009	.012	.008	.008	.011	.009	.013	.014	.011	.010	.007	.003	13 .010
15	.002	.002	.002	.002	.002	.004	.009	.016	.006	.002	.002	.004	.003	.003	.002	*003	.065	.009	.012	.010	.012	.010	.007	.007	24 .008
16	.010	.012	.014	.011	.012	.013	.020	.022	.015	.006	.005														11 .013
N	13	13	13	13	13	13	13	13	13	13	13	13	13	11	11	11	13	14	14	14	14	14	14	14	
MN	.002	.002	.002	.002	.002	.004	.005	.009	.006	.002	.002	.003	.002	-.002	-.006	-.007	-.008	-.008	-.015	-.002	.010	.009	.007	.003	-.015
MX	.035	.039	.043	.047	.044	.039	.035	.033	.043	.034	.034	.029	.033	.036	.041	.036	.065	.028	.028	.042	.048	.074	.089	.085	.089
ME	.019	.022	.022	.022	.017	.018	.020	.021	.020	.015	.013	.013	.012	.014	.014	.014	.018	.012	.011	.019	.025	.026	.029	.028	.019

Table 12. Hourly NO_X Averages in ppm - Aug-Sept. 1976 - Station 1, Brentwood, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.032	.038	.021	.035	.046	.038	.046	.061	.065	.040	.039	.045	.029	.015	.003	.002	.001	.012	.024	.022	.043	.042	.025	.015	24 .031
31	.011	.012	.013	.018	.040	.050	.090	.072	.077	.067	.046	.053	.070	.075		.039	.030	.020	.027	.037	.035	.066	.044	.045	23 .045
01	.076	.096	.098	.095	.094	.116	.198	.191	.132	.134	.110	.067	.094	.046			.014	.035	.037	.050	.040	.048	.051	.097	22 .087
02	.075	.081	.064	.058	.066	.072	.077	.085	.064	.041	.023	.037	.037	.025	.024	.025	.025	.024	.017	.025	.036	.033	.045	.018	24 .045
03	.022	.029	.023	.028	.024	.023	.041	.058	.040	.030	.026	.028	.033	.030	.037	.030	.033	.018	.009	.015	.026	.017	.048	.046	24 .030
04	.036	.033	.045	.042	.027	.035	.035	.041	.043	.039	.032	.021	.022	.035	.029	.028	.023	.018	.015	.020	.017	.011	.021	.027	24 .029
05	.029	.030	.034	.035	.041	.034	.030	.034	.030	.026	.026	.028	.030	.031	.025	.017	.019	.013	.012	.009	.008	.009	.013	.004	24 .024
06	.008	.009	.013	.012	.010	.011	.016	.019	.015	.007	.006	.005	.007	.011	.014	.017	.015	.013	.015	.020	.014	.007	.020	.028	24 .013
07																		.004	.001	.027	.067	.035	.023	.035	7 .027
08	.023	.017	.018	.031	.024	.026	.050	.103	.017	.006	.006	.004	.002			.002	.001	.000	.003	.049	.093	.043	.041	.031	22 .027
09	.019	.026	.025	.008	.013	.038	.072	.057	.058	.023	.010	.009	.006	.010	.007	.012	.024	.021	.018	.017	.021	.032	.022	.018	24 .024
10	.005	.016	.018	.022	.026	.034	.040	.047	.047	.056	.053	.032	.025	.022	.029	.045	.039	.032	.030	.041	.051	.042	.026	.029	24 .034
11	.028	.044	.039	.031	.004	.004	.005	.011	.008	.017	.008	.009	.009	.007	.007	.006	.005	.005	.009	.017	.017	.013	.011	.008	24 .013
12	.008	.007	.012	.007	.005	.006	.007	.009	.007	.005	.005	.003	.003	.003	.002	.002	.013	.011	.012	.018	.021	.031	.025	.027	24 .010
13	.027	.019	.016	.019	.015	.015	.034	.061	.033	.023	.041	.020	.013												13 .026
14												.017	.013	.018	.011	.011	.015	.014	.020	.021	.015	.009	.009	.004	13 .014
15	.003	.004	.003	.003	.004	.006	.012	.034	.016	.006	.007	.011	.009	.008	.006	*005	.001	.015	.018	.014	.014	.013	.008	.012	24 .013
16	.013	.015	.017	.014	.014	.019	.047	.047	.036	.012	.010														11 .022
N	16	16	16	16	16	16	16	16	16	16	16	16	16	16	14	12	13	15	16	16	16	16	16	16	16	
MN	.003	.004	.003	.003	.004	.004	.005	.009	.007	.005	.005	.003	.002	.003	.002	.002	.001	.000	.001	.009	.008	.007	.008	.004	.000
MX	.076	.096	.098	.095	.094	.116	.198	.191	.132	.134	.110	.067	.094	.075	.037	.045	.081	.035	.037	.050	.093	.066	.051	.097	.198
ME	.026	.030	.029	.028	.028	.033	.050	.058	.043	.033	.028	.024	.025	.024	.016	.018	.023	.016	.017	.025	.032	.028	.027	.028	.029

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5.1.1 The High Ozone Readings in Brentwood

Because of the observation of ozone concentrations exceeding 0.3 ppm on 27 through 30 August in Brentwood, California, the data for this site on these days have been reduced using the calibration constants determined in the quality assurance audit performed on 31 August. The station zero and span constants were not used because the ozone lamp in the calibration system was not operating, so no daily span data for nitrogen dioxide and ozone were available for this weekend.

When examining these tabulations, it should be kept in mind that the station had just been moved, it was connected to electric power during the afternoon of Friday, 27 August, and was left for the weekend for the instruments to warm up and stabilize. Furthermore, funds were not available to review these data recorded before the start of the planned field program to delete all readings taken when the instruments were being serviced (on 30 August) or calibrated. The more obvious cases have been deleted from the computer output, but some one-hour averages contain one or two data points that deviate from the true readings.

The one-hour average trace gas concentrations are given in Table 13. The drift in the sulfur dioxide and oxides of nitrogen data as the instruments warm up is particularly evident. The latter instrument does not stabilize until at least the second day. In addition, it was necessary to replace the pump diaphragms during the following week, so the oxides of nitrogen data in Table 13 have more than the customary uncertainty associated with them.

The instrument readings each night during the automatic zero are given at the left of the table. For ozone, it is evident that the readings for station zero air are quite stable, and are 0.02 ppm higher than the zero reading obtained from the five-point calibration made as part of the quality assurance audit. This offset was verified in the quality assurance audit (Table 3 of the Appendix), when it was observed that the Dasibi ozone monitor gave readings 0.012 ppm higher with station zero air than with zero air which had been additionaly processed by the quality assurance zero air scrubber system. In the review of the measurement system operation, no reason has been found to question the ozone data reported here, but it should be recognized that they were obtained before the

Table 13. One-Hour Average Concentrations for 27-31 August 1976 in Brentwood, CA. These Data are Subject to the Uncertainties Described in the Text.

DAY	Zero Air	HOUR 01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Sulfur Dioxide - SO_2																							
27																.249	.269	.184	.193	.115	.105	.105	.106	.105
28	.004	.003	.002	.002	.003	.005	.013	.041	.034	.035	.040	.057	.019	.004	.006	.007	.015	.006	.007	.003	.006	.005	.003	
29	.003	.004	.006	.004	.003	.003	.004	.010	.012	.011	.029	.028	.009	.003	.001	.001	.001	.001	.002	.009	.012	.007	.006	
30	.003	.003	.003	.007	.004	.004	.011	.011	.013	.025	.029	.019	.009	.002	.001	.001	.002	.006	.005	.010	.006	.003	.002	
	Ozone - O_3																							
27																.228	.213	.259	.303	.252	.164	.102	.072	.034
28	.02	.026	.026	.029	.030	.020	.019	.028	.066	.099	.105	.142	.137	.250	.334	.330	.340	.262	.302	.250	.195	.084	.093	.125
29	.02	.102	.039	.024	.029	.022	.029	.033	.066	.119	.159	.161	.200	.292	.346	.375	.366	.330	.338	.272	.196	.117	.116	.105
30	.02	.047	.099	.047	.021	.035	.027	.030	.064	.118	.163	.169	.233	.279	.330	.319	.332	.323	.285	.266	.151	.107	.145	.204
	Nitric Oxide - NO																							
27																.117	.111	.102	.098	.097	.085	.083	.085	.099
28	-.013	.013	.006	-.013	-.014	.003	.015	.020	.007	.003	.009	.010	.009	-.003	-.004	-.002	-.002	.002	-.002	-.002	-.009	-.009	-.013	-.009
29	-.007	-.009	-.009	-.007	-.009	-.001	.006	.012	.006	.001	-.001	.002	-.001	-.003	-.001	-.002	-.001	-.000	-.000	-.002	-.004	-.021	-.027	-.009
30	-.007	-.013	-.010	-.009	.001	-.008	.002	.022	.018	.005	.007	.006	.003	.001	.001	.001	.002	.003	.002	.000	-.004	-.008	-.014	-.008
	Nitrogen Dioxide - NO_2																							
27																-.056	-.037	-.043	-.032	-.037	-.014	.015	.009	-.001
28	.037	.068	.064	.058	.059	.064	.066	.065	.070	.072	.075	.060	.072	.045	.031	.040	.053	.002	.051	.040	.052	.070	.065	.050
29	.029	.052	.073	.074	.068	.066	.060	.058	.069	.069	.050	.061	.052	.039	.028	.025	.024	.021	.024	.040	.063	.087	.088	.049
30	.021	.050	.045	.059	.059	.059	.057	.055	.061		.042	.049	.036	.024	.009	.007	.006	.018	.030	.029	.059	.063	.053	.035
	Oxides of Nitrogen - NO_x																							
27																.075	.084	.068	.072	.068	.074	.099	.096	.103
28	.004	.060	.050	.024	.024	.045	.061	.064	.059	.056	.064	.052	.063	.023	.009	.021	.033	.067	.032	.022	.025	.043	.033	.022
29	.004	.024	.045	.048	.041	.045	.047	.051	.056	.051	.039	.046	.035	.019	.010	.007	.007	.006	.009	.024	.042	.051	.045	.032
30	.004	.043	.025	.039	.051	.043	.051	.067	.071	.039	.042	.050	.034	.020	.007	.006	.005	.016	.029	.026	.048	.047	.029	.019

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calibration of the monitor was verified and therefore contain some uncertainty. To show the unusual nature of these ozone readings, the highest one compared with the highest 1976 oxidant readings in several air basins shown in Figure 7, which is based on a figure in the March 1977 issue of the Bulletin of the California Air Resources Board.

Table 14 summarizes the wind speed and wind direction data during the time of the highest ozone readings. The five-minute wind speed and direction data are included in the data volume.

The oxides of nitrogen data were examined at the times of the high ozone readings to see if they substantiate the observations. It was found that the concentrations of nitrogen oxides were so small that these data neither support nor cast doubt on the ozone data. The NO_x concentration was below 10 ppb on 29 and 30 August at the time of the ozone maxima, and ranged from 15 to about 50 ppb during hour 16 on 28 August. Had the oxides of nitrogen concentrations been higher, it would have been possible to compare the ratio of the NO and NO_2 concentrations to the solar intensity and the ozone concentration.

A tabulation of the 5-minute data points on which the averages reported here are based is included in the data volume.

Table 14. Wind Speed and Wind Direction During the Ozone Maxima at Brentwood, CA.

Day	Hour	Ozone Concentration ppm	Wind Speed mph	Wind Direction degrees
28	16	0.34	7.5 ± 1.2	33 ± 30
29	15	0.37	6.9 ± 1.3	29 ± 27
30	16	0.33	6.7 ± 1.3	40 ± 16

NOTE: The arithmetic mean and standard deviation of the five-minute readings of wind data are reported.

MAXIMUM ONE-HOUR OXIDANT CONCENTRATIONS
1976

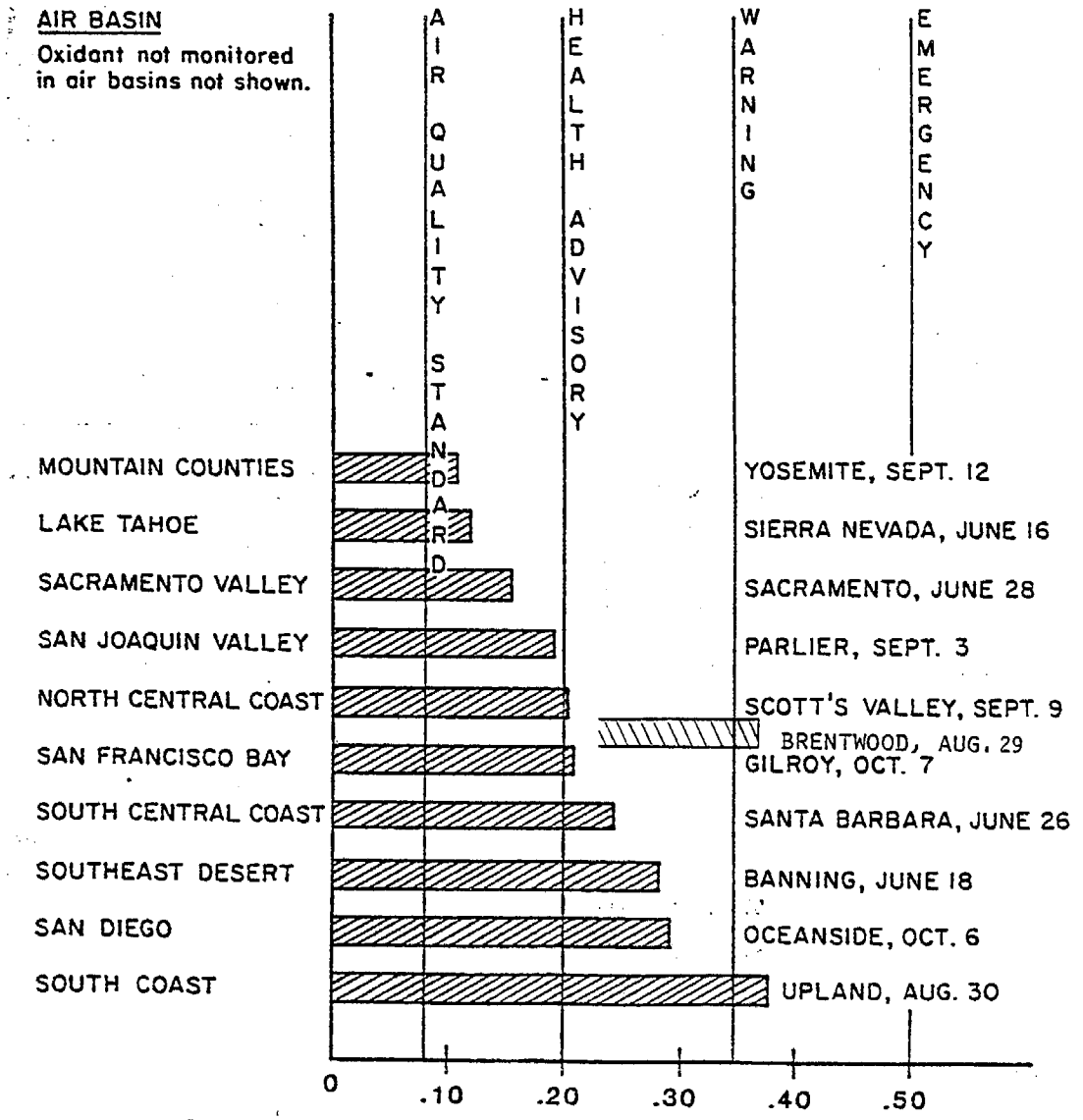

FIGURE 7.

The Brentwood data are subject to the uncertainties described on page 27.

5.2 DATA FROM STATION 2 NEAR COLLINSVILLE, CA.

Tables 15 through 20 summarize the wind data at both the 10 m and 56 m heights, Table 21 gives the temperature averages, and Table 22 gives the temperature difference between the 10 m and 56 m readings. Tables 24 through 29 give the one-hour average relative humdity, in percent, broad band solar radiation intensity, and trace gas concentrations. Complete tabulations of the five-minute data points appear in a separate data volume.

Table 15. Summary of Wind Data - 30 August-16 September 1976
Station 2 Lower Level, Collinsville, CA.

AVERAGE WIND SPEED - 15.6 MI/HR

PREVAILING DIRECTION IS W

MI/HR	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
0.5/ 4.4	0.18	0.04	0.24	0.13	0.18	0.09	0.22	0.20	0.26	0.22	0.18	0.22	0.37	0.73	0.71	0.62
4.5/ 8.9	0.20	0.07	0.42	0.53	0.09	0.07	00.00	0.09	0.55	0.71	0.77	1.43	1.63	2.03	2.03	0.99
9.0/13.4	0.22	0.15	0.60	0.31	0.02	0.02	00.00	0.11	0.02	0.09	0.64	2.89	7.06	4.50	1.28	0.64
13./17.9	0.13	0.11	0.31	0.22	00.00	00.00	00.00	00.00	00.00	00.00	0.20	3.07	16.82	7.23	0.24	0.31
18.0/24.6	0.22	0.20	0.66	0.07	00.00	00.00	00.00	00.00	00.00	00.00	0.24	2.51	18.88	7.10	0.02	0.18
24.7/31.3	0.09	00.00	0.20	0.02	00.00	00.00	00.00	00.00	00.00	00.00	0.02	0.40	4.17	1.19	00.00	0.04
> /31.3	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.09	0.04	00.00	00.00
TOTAL	1.04	0.57	2.43	1.28	0.29	0.18	0.22	0.40	0.84	1.01	2.05	10.52	49.02	22.82	4.28	2.78

TOTAL FREQUENCIES FOR EACH SPEED CLASS

MI/HR	PERCENT
0.5/ 4.4	4.59
4.5/ 8.9	11.60
9.0/13.4	10.54
13./17.9	28.64
18.0/24.6	30.08
24.7/31.3	6.13
> /31.3	0.13

0.29 PERCENT CALM

Table 16. Summary of Wind Data - 30 August-16 September 1976
Station 2 Upper Level, Collinsville, CA.

AVERAGE WIND SPEED = 17.9 MI/HR

PREVAILING DIRECTION IS W

MI/HR	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
0.5/ 4.4	0.31	0.11	0.04	0.07	0.04	00.00	0.09	0.24	0.28	0.11	0.28	0.26	0.20	0.13	0.26	0.24
4.5/ 8.9	0.83	0.48	0.22	0.02	00.00	00.00	0.02	0.20	0.33	0.83	0.88	1.05	1.34	0.99	0.85	0.57
9.0/13.4	0.99	0.39	0.13	0.02	00.00	00.00	0.02	0.02	0.09	0.09	0.37	3.20	5.00	2.94	0.57	1.03
13./17.9	0.53	0.13	0.04	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.09	3.97	13.48	3.24	0.11	0.07
18.0/24.6	0.83	0.15	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.28	8.31	24.00	2.91	0.02	0.22
24.7/31.3	0.64	0.02	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.20	3.07	8.92	0.75	00.00	0.04
> /31.3	0.22	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	00.00	0.04	1.07	0.11	00.00	0.13
TOTAL	4.34	1.29	0.44	0.11	0.04	00.00	0.13	0.46	0.70	1.03	2.10	19.90	54.00	11.07	1.82	2.30

TOTAL FREQUENCIES FOR EACH SPEED CLASS

MI/HR	PERCENT
0.5/ 4.4	2.67
4.5/ 8.9	8.61
9.0/13.4	14.86
13./17.9	21.65
18.0/24.6	36.73
24.7/31.3	13.63
> /31.3	1.58

0.26 PERCENT CALM

Table 17. Daily Wind Summary - Station 2
Lower Level, Collinsville, CA.

DAY	AVG SPEED (MPH)	PRVL DIR
30	13.1	W
31	16.4	W
1	21.5	W
2	19.9	W
3	21.4	W
4	20.0	W
5	19.0	W
6	15.2	W
7	12.9	NE
8	6.6	WNW
9	11.2	W
10	14.0	W
11	12.5	W
12	13.2	W
13	13.9	W
14	19.9	W
15	16.2	W
16	13.2	W

Table 18. Daily Wind Summary - Station 2
Upper Level, Collinsville, CA.

DAY	AVG SPEED (MPH)	PRVL DIR
30	16.1	W
31	19.0	W
1	22.8	W
2	21.6	W
3	23.9	W
4	22.8	W
5	21.4	W
6	16.7	W
7	16.9	N
8	9.5	NNW
9	14.6	W
10	15.6	W
11	13.7	W
12	14.5	W
13	16.4	W
14	22.4	WSW
15	17.3	W
16	15.4	W

Table 19. Hourly Lower Level Wind Speed Averages in MPH - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	15.4	14.3	10.8	11.5	15.0	16.1	12.5	9.8	8.9	8.6	8.3	8.0	10.2	11.9	10.8	9.2	14.1	16.0	16.0	17.1	18.8	17.8	17.1	16.6	24	13.1
31	18.8	18.3	16.8	16.3	20.4	18.1	12.7	14.1	14.4	12.9	12.8	11.1	11.1	12.7	11.7	11.7	14.1	16.9	22.3	21.6	20.1	17.2	22.3	23.4	24	16.4
01	22.3	19.6	18.5	19.9	24.3	24.3	25.1	25.3	22.9	23.8	19.3	17.0	14.1	11.2	12.2	19.1	22.9	25.7	24.6	23.8	24.8	26.1	23.0	24.7	24	21.4
02	21.9	20.3	18.2	17.0	12.4	14.8	19.7	17.6	22.1	19.7	18.6	18.0	20.3	20.1	22.1	21.7	22.2	23.6	24.6	20.1	19.7	15.9	18.0	26.4	24	19.8
03	25.9	26.3	21.7	23.0	23.3	21.8	20.5	19.4	21.2	20.7	20.4	17.1	16.4	18.1	19.4	21.5	23.2	21.2	18.3	17.6	20.1	24.0	23.0	29.9	24	21.4
04	26.2	24.6	24.8	20.7	17.8	19.3	17.7	16.5	17.4	15.3	13.5	15.5	18.7	17.0	22.7	27.4	26.4	20.0	16.5	15.7	16.1	21.9	23.8	24.3	24	20.0
05	23.5	24.7	20.1	17.7	16.8	11.7	17.9	14.7	17.4	19.9	22.2	18.7	16.9	16.5	16.9	19.8	23.6	23.6	20.0	19.0	20.7	18.8	18.7	16.7	24	19.0
06	18.5	19.4	13.5	3.8	10.4	15.9	16.9	20.4	17.2	20.4	16.9	16.0	13.1	10.3	9.9	11.8	13.8	14.8	15.6	12.9	16.8	17.1	18.1	20.7	24	15.2
07	12.5	13.8	15.9	12.1	20.3	21.3	12.4	15.2	22.5	25.5	21.9	19.0	17.3	11.0	8.7	6.2	6.8	10.0	8.7	4.6	4.6	6.7	5.0	6.8	24	12.8
08	4.0	5.2	5.5	3.8	3.9	3.6	3.8	3.7	6.0	20.4	13.9	10.7	11.3	8.8	5.8	4.6	6.8	6.4	3.0	1.5	4.9	5.6	7.6	7.7	24	6.6
09	8.9	6.4	7.9	6.9	7.7	8.6	8.2	4.8	5.9	9.1	9.3	5.2	4.4	5.5	8.5	13.4	15.3	16.8	17.7	14.5	16.3	21.9	23.3	25.5	24	11.3
10	22.6										13.7	9.7	5.7	7.7	9.1	13.8	16.7	12.5	13.0	16.4	17.9	16.2	15.6	12.1	15	13.5
11	9.8	13.3	12.9	11.8	3.4	5.1	16.7	16.4	11.7	12.7	10.4	3.3	3.7	12.2	11.4	11.5	13.6	13.5	15.4	17.7	18.8	19.2	16.7	13.2	24	12.2
12	15.2	15.8	17.1	16.6	14.7	14.2	13.6	13.8	13.8	12.9	12.7	8.9	6.3	6.6	7.7	7.8	10.3	13.8	13.8	14.5	17.4	17.8	18.9	15.5	24	13.2
13	13.2	11.6	12.7	15.5	15.7	12.5	11.6	13.3	14.2	11.8	10.2	9.9	8.3	10.8	11.4	11.6	13.1	13.3	18.9	17.8	24.6	19.7	16.5	17.1	24	13.9
14	16.9	19.6	21.2	21.8	20.4	19.6	18.7	19.6	17.6	18.4	17.8	20.1	20.4	18.3	19.4	22.8	24.2	22.6	25.3	22.5	20.8	19.2	19.7	14.1	24	20.0
15	16.8	19.8	11.8	15.1	15.7	13.1	12.9	16.1	15.7	13.8	10.9	8.6	8.5	8.8	17.2	19.2	19.5	21.3	19.4	19.7	20.8	20.6	20.6	21.5	24	16.1
16	19.6	16.9	11.5	16.6	14.2	15.9	14.5	16.2	13.4	11.2	8.5	8.2	7.3	8.4											14	13.8
N	18	17	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17	
MI	4.0	5.2	5.5	3.8	3.4	3.6	3.8	3.7	5.9	8.6	8.3	3.3	3.7	5.5	5.8	4.6	6.8	6.4	3.0	1.5	4.6	5.6	5.0	6.8		1.5
MX	26.2	26.3	24.8	23.0	24.3	24.3	25.1	25.3	22.9	25.5	22.2	20.1	20.4	20.1	22.7	27.4	26.4	25.7	25.3	23.8	24.8	26.1	23.8	29.9		29.9
ME	17.3	17.0	15.3	14.8	15.1	15.1	15.0	15.1	15.4	16.3	14.5	12.5	11.9	12.0	13.2	14.8	16.9	17.1	17.2	16.3	17.8	18.8	18.1	18.6		15.6

Table 20. Hourly Upper Level Wind Speed Averages in MPH - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	28.5	20.4	19.3	20.1	18.6	17.8	17.1	14.6	9.1	7.7	6.6	8.9	9.8	10.7	10.2	8.3	13.6	14.5	18.5	21.8	23.6	23.8	24.3	22.2	24	15.9
31	21.8	24.9	24.8	25.5	23.6	21.5	18.3	17.1	16.4	16.1	12.5	11.2	10.5	10.7	10.0	9.6	14.2	17.8	23.0	26.3	23.6	25.2	26.7	26.3	24	19.0
01	25.6	24.3	22.6	22.5	23.1	22.4	24.2	24.3	24.2	22.9	18.6	16.1	12.2	10.8	11.7	18.0	24.2	26.9	27.6	26.1	29.2	30.8	27.7	26.9	24	22.6
02	22.5	22.8	19.5	17.4	12.2	14.8	21.2	21.5	21.8	18.8	19.0	18.0	19.7	20.6	20.7	20.8	20.8	23.0	26.1	25.3	27.4	21.4	23.1	29.7	24	21.1
03	31.2	32.3	25.6	25.8	26.6	25.8	26.1	22.0	22.8	21.1	20.4	18.8	16.8	17.8	19.4	20.6	21.4	21.6	20.5	21.8	26.1	29.1	30.1	33.1	24	23.9
04	31.6	29.8	28.8	25.4	24.8	22.7	21.9	19.8	18.5	15.2	12.9	15.1	18.3	16.9	22.3	27.0	26.0	21.6	18.5	19.3	22.5	27.7	29.8	30.8	24	22.8
05	28.1	28.2	25.3	21.6	21.4	17.7	21.2	20.2	19.7	20.9	19.7	19.1	17.8	15.3	17.8	20.2	23.5	22.2	20.9	21.9	23.8	22.4	22.3	21.6	24	21.4
06	22.7	24.3	13.7	3.5	10.9	18.5	19.7	21.7	17.6	18.9	16.5	14.5	11.7	11.4	9.8	13.7	13.6	15.9	16.1	16.0	19.1	22.9	23.3	25.5	24	16.7
07	19.7	20.6	20.2	19.1	30.9	30.7	23.1	25.2	28.1	25.3	22.2	18.6	16.7	12.6	8.7	6.1	7.9	10.2	8.6	5.6	6.0	12.5	14.9	11.5	24	16.9
08	11.8	10.4	10.1	10.3	8.3	9.6	9.4	9.3	10.3	19.3	14.5	11.6	11.2	9.3	6.0	5.4	5.5	6.7	2.8	1.4	8.4	9.8	13.4	13.4	24	9.5
09	14.1	15.0	17.1	14.5	14.9	13.7	12.0	10.1	7.5	8.7	9.2	6.3	4.5	5.0	8.7	12.3	15.6	17.2	22.9	20.2	21.4	24.5	27.5	28.7	24	14.6
10	28.4										13.5	8.6	5.3	6.1	8.7	12.1	18.9	14.6	15.0	18.5	21.1	20.0	19.1	15.8	15	15.0
11	14.7	16.4	15.6	14.2	3.3	6.3	18.5	17.1	13.5	14.7	11.9	3.4	4.4	12.4	12.8	11.8	13.3	14.1	15.9	18.6	20.7	20.3	18.1	17.9	24	13.7
12	18.6	18.4	18.4	18.1	16.5	17.3	15.9	15.4	14.0	12.8	12.5	8.6	6.8	7.1	7.7	7.6	10.3	12.6	13.5	18.4	20.0	20.4	20.6	18.4	24	14.6
13	16.7	16.4	18.8	21.8	21.0	18.3	16.9	18.5	15.9	11.2	8.4	10.3	7.6	9.6	9.8	12.0	12.6	13.2	19.4	21.4	27.9	24.0	21.6	21.3	24	16.5
14	21.2	25.9	27.6	25.8	24.6	24.8	23.6	24.0	19.8	18.1	17.5	18.7	20.8	18.8	19.2	23.8	23.3	21.7	26.2	23.5	22.9	24.0	23.8	17.3	24	22.3
15	20.5	21.2	11.7	16.1	18.6	14.5	15.2	19.1	16.4	13.2	11.5	8.9	8.0	10.1	17.4	19.1	18.7	20.8	20.4	20.5	21.8	23.7	23.4	23.3	24	17.3
16	23.4	19.6	16.6	19.6	18.6	19.0	17.9	18.6	14.9	12.0	8.8	7.7	6.7	5.8											14	14.9
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17		
MN	11.8	10.4	10.1	3.5	3.3	6.3	9.4	9.3	7.5	7.7	6.6	3.4	4.4	5.0	6.0	5.4	5.5	6.7	2.8	1.4	6.0	9.8	13.4	11.5		1.4
MX	31.6	32.3	28.8	25.8	30.9	30.7	26.1	25.2	28.1	25.3	22.2	19.1	20.8	20.6	22.3	27.0	26.0	26.9	27.6	26.3	29.2	30.8	30.1	33.1		33.1
ME	21.8	21.8	19.7	18.9	18.7	18.6	18.9	18.7	17.0	16.3	14.2	12.4	11.6	11.7	13.0	14.6	16.7	17.3	18.6	19.2	21.5	22.5	22.9	22.6		17.9

Table 21. Hourly Temperature Averages in Centigrade - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	21.1	20.0	19.2	18.8	18.2	16.7	16.1	16.7	18.8	22.6	25.4	28.7	30.2	32.1	34.0	34.1	35.9	35.5	34.3	31.1	27.6	25.5	25.4	24.5	24	25.5
31	22.6	19.7	19.0	19.2	17.3	16.9	15.4	15.5	18.2	21.0	24.2	28.3	30.5	31.8	33.3	35.4	35.8	35.4	33.0	29.2	25.7	23.2	21.3	19.6	24	24.6
01	17.3	16.9	16.1	16.2	16.0	15.7	15.3	15.4	15.8	17.7	19.9	23.3	27.1	30.3	31.1	31.5	31.1	29.1	27.6	24.5	22.0	19.4	18.2	17.2	24	21.5
02	15.7	15.4	14.6	16.0	15.2	14.7	14.7	14.8	16.0	17.9	21.0	23.1	25.4	27.0	27.8	29.0	30.2	29.4	27.9	26.0	23.4	20.7	18.9	17.2	24	20.9
03	14.7	14.6	14.6	14.1	13.3	12.6	12.7	12.7	14.0	15.1	16.9	18.4	20.4	22.7	25.6	26.4	26.6	27.2	26.7	23.3	20.6	17.8	16.3	14.3	24	18.4
04	12.2	12.7	12.6	12.4	12.8	12.4	13.0	12.6	13.8	15.6	18.6	21.3	23.1	26.0	25.5	25.8	25.2	26.8	26.5	23.5	22.2	20.9	18.6	18.7	24	18.9
05	15.8	15.7	16.2	16.1	15.5	14.9	15.1	15.1	15.5	16.9	18.2	20.9	22.8	25.6	27.4	27.8	26.8	25.9	25.0	22.5	19.4	17.2	16.7	16.5	24	19.5
06	15.8	15.9	17.0	16.2	14.9	14.5	15.1	14.7	16.8	17.9	18.7	20.7	22.6	24.7	26.2	26.8	26.7	26.5	24.6	21.6	18.9	18.5	17.6	17.1	24	19.5
07	15.5	15.1	15.8	16.4	20.3	20.8	18.4	19.1	21.5	23.1	25.2	26.5	27.7	29.7	30.3	30.9	31.5	32.1	31.7	30.6	28.5	23.3	23.8	24.3	24	24.2
08	22.9	22.6	20.5	23.2	23.8	23.0	19.9	22.8	21.7	25.5	27.7	29.3	30.5	31.8	32.7	34.0	34.0	33.3	32.8	32.1	29.9	26.9	25.6	25.7	24	27.1
09	24.6	24.5	23.9	24.1	23.1	22.7	21.6	20.9	23.0	25.8	28.1	30.4	31.7	33.2	34.2	35.6	34.6	33.8	31.8	29.8	27.8	25.7	25.1	24.4	24	27.5
10	24.1										22.3	23.8	25.2	24.3	25.5	25.4	25.2	24.9	22.2	20.9	19.8	20.0	19.0	18.3	15	22.7
11	17.8	18.2	16.6	16.7	18.1	16.9	16.3	15.0	14.7	15.8	16.5	16.1	17.7	17.6	18.1	18.8	18.6	18.5	17.6	16.1	15.7	15.5	14.2	14.1	24	16.7
12	12.8	12.6	11.8	13.7	13.2	13.4	13.4	14.0	14.1	15.4	16.5	18.8	19.2	20.6	21.5	22.1	22.6	22.9	22.2	20.7	18.2	17.8	17.8	16.9	24	17.1
13	14.9	14.5	15.1	15.8	15.6	15.4	14.8	14.8	16.0	17.8	19.7	21.7	23.7	24.6	26.1	26.9	26.9	26.6	25.5	23.2	19.5	18.8	18.5	18.0	24	19.8
14	16.3	15.9	15.8	17.8	17.9	16.8	16.8	16.5	18.0	19.8	20.4	20.7	22.6	23.7	25.4	26.5	25.5	24.2	22.8	20.6	19.6	18.8	18.8	18.1	24	19.9
15	15.3	14.2	13.9	14.3	14.5	13.9	13.5	13.2	15.7	17.4	19.0	20.8	20.5	21.4	21.3	21.2	20.6	19.7	17.9	16.7	15.4	14.4	14.1	13.2	24	16.7
16	12.3	11.6	11.5	12.8	13.8	12.9	12.9	12.8	14.3	15.2	16.4	17.4	19.0	18.8											14	14.3
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17		
MN	12.8	11.6	11.5	12.4	12.8	12.4	12.7	12.6	13.8	15.1	16.4	16.1	17.7	17.6	18.1	18.8	18.6	18.5	17.6	16.1	15.4	14.4	14.1	13.2		11.5
MX	24.6	24.5	23.9	24.1	23.1	23.8	21.6	22.8	23.0	25.8	28.1	30.4	31.7	33.2	34.2	35.6	35.9	35.5	34.3	32.1	29.9	26.9	25.6	25.7		35.9
ME	17.2	16.5	16.1	16.7	16.6	16.1	15.6	15.6	16.9	18.8	20.8	22.7	24.4	25.9	27.4	28.1	28.1	27.8	26.5	24.2	22.0	20.3	19.3	18.7		20.9

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Table 22. Hourly Temperature Difference Averages in Centigrade - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	3.9	5.1	6.4	5.1	6.9	7.1	1.5	2.7	1.9	-0.5	-0.9	-1.1	-0.9	-0.7	-1.2	-1.2	-1.0	-0.9	-0.3	1.0	1.0	1.1	1.3	2.0	24	1.6
31	3.4	5.5	6.5	7.5	8.1	8.2	5.4	7.3	5.0	3.3	0.9	-1.1	-1.2	-1.2	-1.1	-1.3	-1.3	-0.9	-0.7	1.0	3.1	4.4	5.9	6.3	24	3.0
01	6.2	5.4	7.8	8.0	8.2	7.7	6.3	3.2	1.0	0.4	1.0	-0.7	-0.8	-1.3	-1.4	-1.3	-1.0	-0.8	-0.2	2.1	2.3	2.5	2.5	3.4	24	2.5
02	7.0	5.6	3.2	2.2	1.5	0.7	2.9	1.6	1.1	0.8	-0.9	-1.1	-1.3	-1.4	-1.1	-1.1	-1.0	-0.8	-0.5	0.4	1.3	2.7	1.8	0.4	24	1.0
03	0.2	0.1	-0.0	-0.6	-0.6	-0.5	-0.5	-0.6	-1.0	-1.2	-1.2	-1.3	-1.5	-1.3	-1.4	-1.2	-0.9	-0.8	-0.5	1.6	0.6	1.1	0.1	0.1	24	-0.5
04	-0.7	-0.6	-0.6	-0.8	-0.8	-0.7	-0.8	-0.8	-1.1	-1.2	-0.8	-1.1	-1.1	-1.3	-1.0	-1.1	-0.9	-0.8	-0.7	0.9	2.1	2.7	2.7	0.8	24	-0.3
05	0.4	0.9	0.1	0.3	1.2	1.3	1.9	0.4	-0.9	-1.2	-1.1	-1.3	-1.4	-1.3	-1.2	-0.9	-0.9	-0.8	-0.8	0.1	1.1	2.3	3.2	1.0	24	0.1
06	1.6	1.5	0.7	0.8	2.2	1.6	0.9	0.2	-0.7	-1.0	-1.2	-1.2	-1.2	-1.3	-1.2	-1.1	-1.1	-1.0	-0.8	0.1	2.1	2.4	3.4	2.7	24	0.3
07	2.5	0.7	1.1	2.7	1.3	0.6	1.0	1.4	-0.5	-0.9	-1.0	-1.2	-1.3	-1.2	-1.0	-1.0	-1.0	-0.9	-0.7	-0.2	0.4	0.9	1.1	1.4	24	0.2
08	1.6	1.5	3.2	2.5	1.4	0.7	2.4	0.5	0.0	-0.9	-1.1	-1.1	-1.2	-1.2	-1.1	-1.1	-1.0	-0.8	-0.7	-0.4	0.4	0.4	1.3	1.3	24	0.3
09	2.1	2.0	2.2	2.3	2.9	2.6	2.1	1.7	-0.4	-0.9	-1.0	-1.1	-1.0	-1.1	-1.0	-1.2	-0.9	-0.6	0.2	0.8	0.4	0.5	0.9	1.1	24	0.5
10	1.2										-0.5	-0.6	-0.9	-0.8	-0.8	-0.8	-0.4	-0.4	0.7	1.0	0.5	0.8	0.1	0.9	15	-0.0
11	0.3	0.1	0.9	-0.3	-0.6	-0.6	-0.8	-0.9	-0.9	-0.9	-0.9	-0.9	-1.0	-1.1	-0.9	-1.0	-0.9	-0.8	-0.8	-0.6	-0.8	-0.8	-0.6	-0.4	24	-0.6
12	-0.4	-0.8	-0.7	-0.8	-0.7	-0.6	-0.7	-0.8	-0.9	-1.0	-1.0	-1.2	-0.9	-1.1	-1.1	-1.1	-1.0	-0.9	-0.8	-0.4	-0.3	-0.6	-0.5	-0.1	24	-0.8
13	0.3	0.3	0.3	0.2	0.2	0.2	0.5	0.2	-0.8	-0.9	-1.0	-1.2	-1.1	-1.0	-1.1	-1.1	-1.0	-0.9	-0.8	0.2	-0.1	0.6	1.7	2.8	24	-0.1
14	2.8	1.9	1.8	0.3	0.3	0.2	0.1	0.2	-0.7	-1.0	-1.1	-1.0	-1.1	-1.2	-1.1	-1.3	-1.1	-1.0	-0.6	-0.3	-0.2	-0.4	-0.2	-0.3	24	-0.2
15	-0.2	-0.5	0.2	0.9	-0.0	0.6	1.1	1.0	-0.7	-0.9	-1.0	-1.0	-1.0	-1.1	-1.1	-1.2	-1.0	-1.0	-0.8	-0.8	-0.8	-0.8	-0.7	-0.7	24	-0.5
16	-0.9	-0.7	-0.4	-0.3	-0.4	-0.4	-0.3	-0.4	-0.9	-1.0	-1.0	-1.0	-1.1	-1.0											14	-0.7
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17		
MN	-0.9	-0.8	-0.7	-0.8	-0.8	-0.7	-0.8	-0.9	-1.1	-1.2	-1.2	-1.3	-1.5	-1.4	-1.4	-1.3	-1.3	-1.0	-0.8	-0.8	-0.8	-0.8	-0.7	-0.7		-1.5
MX	7.0	5.6	7.8	8.0	8.2	8.2	6.3	7.3	5.0	3.3	1.0	-0.6	-0.8	-0.7	-0.8	-0.8	-0.4	-0.4	0.7	2.1	3.1	4.4	5.9	6.3		8.2
ME	1.7	1.7	1.9	1.8	1.8	1.7	1.3	1.0	-0.0	-0.5	-0.8	-1.1	-1.1	-1.1	-1.1	-1.1	-1.0	-0.8	-0.5	0.4	0.8	1.2	1.4	1.3		0.4

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Table 23. Hourly Relative Humidity Averages in Percent - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	38.1	43.4	49.1	51.1	56.0	60.6	61.6	61.0	56.5	45.8	35.7	29.2	27.0	24.4	23.7	24.8	18.8	16.2	16.7	22.2	29.0	25.0	24.5	27.2	24	36.2
31	31.2	43.0	45.8	46.2	57.4	57.8	66.6	69.6	57.8	48.3	41.4	27.2	26.8	23.2	20.4	15.9	14.4	12.5	21.9	27.9	34.1	38.4	45.2	51.9	24	38.5
01	52.6	53.9	59.6	62.4	63.1	64.7	66.2	64.8	64.5	57.0	51.7	43.3	36.5	27.9	25.2	25.3	26.6	31.8	32.1	40.4	46.5	53.2	54.7	61.1	24	48.5
02	60.1	60.6	66.4	65.1	70.5	70.1	68.2	69.1	65.4	59.9	51.0	46.5	38.8	34.2	34.4	30.9	29.5	31.1	33.9	35.9	36.8	45.1	47.9	52.2	24	50.1
03	54.6	56.8	61.9	64.1	66.2	70.7	69.5	70.5	68.5	62.8	57.3	51.7	43.9	40.8	35.7	30.8	26.1	22.3	21.8	34.2	44.8	47.3	54.2	65.6	24	50.8
04	70.8	73.8	77.8	75.1	71.8	76.5	70.8	75.1	70.8	66.9	57.2	49.2	44.4	37.5	36.9	36.8	35.5	31.4	29.8	32.9	38.1	48.7	47.2	42.4	24	53.6
05	55.1	58.6	54.7	55.5	63.7	67.6	63.3	63.2	63.6	59.4	56.1	47.9	40.9	34.1	26.2	24.2	30.5	36.4	37.8	41.7	47.5	55.4	52.7	54.4	24	49.6
06	58.8	58.7	57.9	59.3	61.9	66.9	63.3	64.8	63.8	56.2	55.7	50.3	46.1	37.5	36.4	33.5	34.1	33.7	37.2	45.7	51.7	51.1	55.8	56.5	24	51.4
07	55.8	56.3	58.7	56.7	25.4	20.7	29.8	25.6	21.4	20.7	17.7	17.6	18.1	17.2	17.3	16.6	15.9	14.7	14.1	14.3	18.5	32.8	27.9	24.9	24	26.6
08	23.4	23.8	26.4	23.4	23.2	22.9	30.1	26.7	28.6	19.8	17.8	14.6	14.5	13.3	13.6	13.3	13.2	15.9	14.1	12.7	15.5	23.7	25.9	20.8	24	19.8
09	21.7	22.1	22.3	22.2	22.8	24.2	28.6	30.8	28.9	23.3	21.3	19.2	20.2	19.4	18.8	14.5	12.8	12.2	17.8	21.2	18.6	22.5	23.4	22.8	24	21.3
10	23.2										34.8	29.8	30.2	34.2	31.0	25.8	21.6	21.1	36.4	41.6	37.7	39.9	43.7	52.5	15	33.5
11	49.9	49.4	58.8	58.8	53.2	58.4	57.8	65.2	69.6	66.5	65.8	67.3	62.1	60.4	54.9	53.7	53.7	51.3	51.8	57.6	55.3	54.3	61.3	57.8	24	58.1
12	60.6	59.4	64.6	61.4	62.4	60.6	59.1	59.6	56.7	53.2	51.6	49.8	48.2	46.8	43.7	40.7	40.5	38.9	39.5	47.3	54.9	55.1	56.9	56.3	24	52.8
13	54.9	58.4	57.4	58.2	59.6	61.5	62.9	63.6	60.5	57.4	56.2	49.3	44.8	41.3	36.4	32.8	29.3	29.5	35.4	39.8	47.8	48.5	41.8	43.9	24	48.7
14	45.6	45.7	47.5	46.3	41.5	46.7	44.5	42.8	39.8	40.2	39.8	38.2	34.1	33.4	30.6	32.2	38.1	41.3	42.8	46.6	45.1	48.2	49.6	49.6	24	42.8
15	51.1	54.4	56.6	55.9	55.8	58.9	57.5	58.4	52.7	45.8	39.3	39.3	38.5	35.5	38.4	40.3	40.3	43.8	49.2	52.4	54.6	57.9	57.8	63.5	24	49.8
16	60.1	64.5	63.1	64.6	63.5	63.1	64.4	65.6	59.1	56.4	52.5	51.4	44.5	47.7											14	58.6
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17		
MN	21.7	22.1	22.3	22.2	22.8	20.7	28.6	25.6	21.4	19.8	17.8	14.6	14.5	13.3	13.6	13.3	12.8	12.2	14.1	12.7	15.5	22.5	23.4	20.8		12.2
MX	70.8	73.8	77.8	75.1	71.8	76.5	70.8	75.1	70.8	66.9	65.8	67.3	62.1	60.4	54.9	53.7	53.7	51.3	51.8	57.6	55.3	57.9	61.3	65.6		77.8
ME	48.1	51.9	54.5	54.6	54.8	56.8	56.7	57.4	54.5	49.3	44.5	40.1	36.6	33.7	30.8	28.8	28.3	28.4	31.1	36.1	39.7	43.5	45.3	47.2		43.8

Table 24. Hourly Broad Band Solar Radiation Average in Cal cm^{-2} min^{-1} - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																									
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N	MEAN
30	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.4	0.7	1.0	1.2	1.4	1.4	1.3	1.1	0.9	0.6	0.3	0.0	-0.1	-0.0	-0.0	-0.1	24	0.4
31	-0.2	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.5	0.8	1.0	1.3	1.3	1.4	1.4	1.2	0.9	0.6	0.3	-0.0	-0.0	0.0	-0.1	-0.1	24	0.4
01	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.4	0.8	1.0	1.3	1.3	1.4	1.3	1.1	0.9	0.6	0.3	-0.0	-0.0	-0.0	-0.0	-0.1	24	0.4
02	-0.1	-0.1	-0.1	-0.0	-0.1	-0.0	-0.0	0.1	0.4	0.7	1.0	1.2	1.3	1.4	1.3	1.1	0.8	0.6	0.2	-0.0	0.0	-0.0	-0.0	-0.0	24	0.4
03	-0.1	-0.0	-0.0	-0.0	-0.0	-0.1	-0.0	0.1	0.4	0.8	1.0	1.1	1.3	1.3	1.3	1.1	0.9	0.6	0.3	-0.0	-0.0	-0.0	-0.0	-0.0	24	0.4
04	-0.1	-0.1	-0.1	-0.0	-0.0	-0.1	-0.0	0.1	0.4	0.7	1.0	1.2	1.2	1.1	1.2	0.9	0.6	0.5	0.3	-0.0	-0.0	-0.0	-0.1	-0.0	24	0.4
05	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.4	0.7	1.0	1.1	1.3	1.2	1.1	0.9	0.6	0.4	0.2	-0.0	-0.0	-0.1	-0.0	-0.0	24	0.3
06	-0.1	-0.0	-0.1	-0.0	-0.0	-0.1	-0.0	0.0	0.4	0.7	1.0	1.2	1.3	1.4	1.2	1.1	0.7	0.5	0.2	0.0	-0.0	-0.0	-0.0	-0.0	24	0.4
07	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.4	0.7	1.0	1.2	1.3	1.3	1.2	1.1	0.8	0.5	0.2	-0.0	-0.0	-0.0	-0.0	-0.0	24	0.4
08	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.4	0.7	1.0	1.2	1.3	1.4	1.3	1.1	0.8	0.5	0.2	-0.0	-0.1	-0.1	-0.1	-0.0	24	0.4
09	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.1	0.0	0.4	0.7	1.0	1.2	1.3	1.3	1.0	1.1	0.5	0.2	0.1	-0.0	-0.0	-0.1	-0.0	-0.0	24	0.3
10	-0.1										0.3	0.4	0.4	0.4	0.3	0.3	0.2	0.1	0.0	-0.1	-0.0	-0.0	-0.1	-0.0	15	0.1
11	-0.1	-0.0	-0.0	-0.1	-0.1	-0.0	-0.0	-0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.4	0.3	0.1	0.1	-0.1	-0.0	-0.0	-0.1	-0.0	24	0.1
12	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	0.0	-0.0	0.1	0.3	0.6	1.1	1.0	1.3	1.2	1.0	0.7	0.5	0.2	-0.0	-0.1	-0.1	-0.0	-0.1	24	0.3
13	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.4	0.7	0.9	1.1	1.3	1.3	1.2	1.1	0.8	0.5	0.2	-0.0	-0.0	-0.0	-0.1	-0.0	24	0.4
14	-0.1	-0.1	-0.1	-0.0	-0.0	-0.1	-0.0	0.1	0.4	0.7	0.8	1.0	0.9	1.0	1.2	1.0	0.7	0.5	0.1	-0.1	-0.0	-0.0	-0.0	-0.0	24	0.3
15	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.4	0.7	1.0	1.1	1.2	1.3	1.2	1.0	0.7	0.4	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	24	0.4
16	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.4	0.7	0.9	1.0	1.2	1.0											14	0.3
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17		
MN	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.0	0.0	0.0	0.1	0.2	0.4	0.4	0.3	0.3	0.2	0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1		-0.2
MX	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.1	0.5	0.8	1.0	1.3	1.4	1.4	1.4	1.2	0.9	0.6	0.3	0.0	0.0	0.0	-0.0	-0.0		1.4
ME	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.4	0.7	0.9	1.1	1.1	1.2	1.1	1.0	0.7	0.5	0.2	-0.0	-0.0	-0.0	-0.0	-0.0		0.3

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Table 25. Hourly SO_2 Averages in ppm - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.030	.031	.032	.031	.036	.035	.041	.035	.036	.031	.028	.029	.022	.019	.022	.012	.010	.021	.013	.012	.017	.018	.030	.030	24 .026
31	.016	.011	.014	.020	.023	.025	.023	.021	.022	.021	.017	.017	.027	.026	.008	.019	.029	.012	.001	-.001	.003	.009	.015	.014	24 .016
01	.022	.017	.014	.016	.016	.016	.019	.027	.026	.019	.021	.026	.017	.011	.011	.008	.024	.043	.022	.005	.006	.007	.014	.012	24 .017
02	.008	.010	.010	.011	.006	.010	.009	.010	.008	.010	.017	.021	.019	.015	.017	.015	.007	.017	.015	.004	.000	.003	.004	.001	24 .010
03	-.000	.002	.002	.001	.003	.003	.004	.003	.005	.006	.009	.010	.013	.011	.008	.007	.008	.007	.004	.003	.003	.004	.003	.005	24 .005
04	.015	.009	.002	.005	.009	.013	.012	.010	.010	.011	.014	.014	.014	.011	.006	.003	.018	.009	.016	.010	.007	.006	.009	.004	24 .010
05	.010	.011	.007	.006	.005	.008	.011	.009	.011	.023	.019	.016	.017	.017	.007	.010	.009	.007	.002	.001	-.000	-.002	-.001	-.001	24 .009
06	-.004	-.002	-.002	-.002	-.002	-.002	-.002	-.002	-.003	-.001	.002	.002	.001	.001	.001	-.000	.000	.006	.003	.000	.002	.004	.009	.013	24 .001
07	.015	.011	.006	.010	.001	.001	.001	.001	.000	.000	.000	.000	.000	.000	.001	.000	.000	.000	.000	.000	.001	.003	.009	.010	24 .004
08	.019	.031	.010	.006	.005	.004	.006	.009	.006	-.001	-.001	-.001	-.001	-.001	-.001	-.001	-.001	-.002	-.001	-.001	.001	.003	.027	.021	24 .006
09	.030	.023	.007	.052	.034	.033	.020	.014	.002	-.001	-.002	.027	.032	-.006	-.008	-.008	.022	.017	.009	-.005	-.001	-.007	-.008	-.008	24 .014
10	-.008										.033	.035	.019	.036	.022	.009	.010	.009	.008	.007	.007	.004	.007	.008	15 .014
11	.002	.000	-.004	.001	.001	.001	-.004	.007	-.008	-.008	-.008	-.005	-.007	-.003	-.003	-.003	-.002	-.001	.001	.001	.005	.007	.001	-.002	24 -.001
12	-.004	-.001	.001	.001	-.003	-.003	-.003	-.003	-.001	-.004	-.004	-.004	-.004	-.004	-.004	-.001	-.002	.000	.000	-.000	-.001	-.002	.006	.005	24 -.001
13	-.002	.007	.009	.007	.011	.017	.014	.011	.016	.016	.010	.007	-.001	-.002	-.003	.000	.000	-.000	-.000	-.000	.001	.010	-.001	-.001	24 .005
14	-.002	.000	.000	.000	.002	.005	.005	.004	.005	.007	.006	.008	.007	.005	.003	.000	.000	-.001	.003	-.004	-.002	-.004	-.005	-.005	24 .002
15	.007	.009	.002	-.001	.001	.001	-.002	-.002	.002	-.001	-.000	.001	.003	.007	.003	.003	.003	-.001	.005	.006	.003	-.000	.001	.004	24 .002
16	.000	.005	.003	.002	.000	.000	.005	.004	.004	.003	.002	.002	.004	.003											14 .003
N	18	17	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	
MN	-.008	-.002	-.004	-.002	-.003	-.003	-.004	-.003	-.008	-.008	-.008	-.005	-.007	-.006	-.008	-.008	-.002	-.002	-.001	-.005	-.002	-.007	-.008	-.008	-.008
MX	.030	.031	.067	.052	.036	.035	.041	.035	.036	.031	.033	.035	.032	.036	.022	.019	.029	.043	.022	.012	.017	.018	.030	.030	.067
ME	.009	.010	.011	.010	.009	.010	.010	.009	.008	.008	.009	.012	.010	.008	.005	.004	.008	.008	.006	.002	.003	.004	.007	.007	.008

Table 26. Hourly O_3 Averages in ppm - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.016	.002	.009	.015	.015	.015	.014	.016	.023	.038	.062	.084	.126	.150	.152	.146	.139	.140	.133	.107	.065	.042	.036	.039	24 .066
31	.013	.003	.006	.014	.014	.014	.014	.016	.024	.033	.060	.080	.102	.117	.145	.117	.129	.103	.115	.080	.039	.024	.015	.015	24 .054
01	.000	.001	.003	.014	.015	.013	.014	.035	.027	.030	.042	.048	.078	.094	.108	.109	.118	.095	.071	.046	.027	.018	.014	.013	24 .043
02	-.001	.001	.006	.015	.015	.021	.021	.021	.029	.039	.049	.065	.072	.087	.101	.102	.102	.095	.080	.063	.033	.016	.022	.015	24 .045
03	.001	.011	.018	.020	.021	.020	.019	.021	.022	.025	.028	.025	.036	.055	.072	.079	.058	.063	.066	.039	.026	.026	.042	.025	24 .034
04	.007	.014	.027	.027	.022	.018	.028	.025	.037	.042	.044	.056	.068	.090	.092	.090	.076	.081	.081	.082	.053	.034	.039	.058	24 .050
05	.023	.035	.036	.036	.027	.021	.023	.026	.031	.033	.040	.055	.066	.077	.083	.084	.081	.080	.069	.039	.025	.021	.019	.024	24 .044
06	.013	.021	.018	.019	.022	.018	.016	.021	.023	.029	.040	.044	.044	.065	.079	.085	.070	.067	.043	.025	.016	.016	.016	.016	24 .034
07	.001	.001	.005	.018	.045	.044	.035	.037	.042	.042	.047	.048	.059	.074	.080	.086	.079	.078	.072	.067	.060	.042	.036	.046	24 .048
08	.022	.025	.020	.041	.043	.040	.034	.031	.039	.047	.043	.051	.056	.066	.072	.075	.078	.072	.078	.082	.082	.095	.058	.048	24 .054
09	.049	.055	.045	.047	.040	.041	.026	.034	.056	.060	.069	.089	.103	.110	.114	.127	.149	.130	.146	.070	.052	.049	.048	.046	24 .073
10	.040										.041	.045	.050	.058	.076	.078	.069	.054	.038	.036	.025	.020	.026	.015	15 .045
11	.024	.018	.022	.024	.017	.039	.050	.035	.053	.046	.039	.041	.051	.054	.068	.072	.083	.080	.067	.055	.046	.047	.045	.046	24 .047
12	.028	.027	.023	.040	.049	.045	.046	.052	.051	.055	.057	.064	.071	.073	.088	.106	.109	.116	.116	.074	.047	.037	.036	.036	24 .060
13	.018	.012	.008	.025	.020	.016	.017	.024	.028	.039	.072	.081	.099	.123	.098	.107	.097	.089	.088	.073	.041	.027	.035	.018	24 .052
14	.004	.015	.026	.034	.036	.031	.035	.037	.040	.033	.046	.045	.051	.055	.065	.056	.046	.039	.033	.025	.022	.032	.032	.034	24 .036
15	.012	.010	.014	.033	.029	.028	.032	.032	.034	.044	.040	.052	.065	.055	.063	.066	.068	.051	.038	.024	.019	.018	.021	.027	24 .037
16	.009	.018	.010	.023	.018	.025	.018	.025	.028	.033	.036	.040	.052	.056											14 .028
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	17	17	17	17	17	17	17	
MI	-.001	.001	.003	.014	.014	.013	.014	.016	.022	.025	.028	.025	.036	.054	.063	.056	.046	.039	.033	.024	.016	.016	.014	.013	-.001
MX	.049	.055	.045	.047	.049	.045	.050	.052	.056	.060	.072	.089	.126	.150	.152	.146	.149	.140	.146	.107	.082	.095	.058	.058	.152
ME	.015	.016	.017	.026	.026	.026	.026	.029	.034	.040	.049	.056	.069	.081	.092	.093	.091	.084	.078	.058	.040	.033	.032	.031	.048

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Atomics International Division
Air Monitoring Center

Table 27. Hourly NO Averages in ppm - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.023	.022	.022	.032	.034	.035	.031	.032	.039	.032	.023	.021	.019	.018	.017	.016	.017	.017	.017	.017	.016	.016	.016	.016	24 .023
31	.013	.001	.005	.018	.020	.022	.025	.030	.035	.034	.025	.020	.019	.017	.017	.017	.017	.017	.017	.016	.016	.016	.017	.018	24 .019
01	.017	.011	.017	.027	.026	.029	.024	.029	.035	.039	.036	.034	.026	.022	.021	.020	.020	.020	.019	.019	.021	.025	.026	.029	24 .025
02	.027	.019	.018	.025	.025	.021	.015	.020	.024	.026	.027	.025	.019	.017	.016	.016	.016		.014	.014	.014	.015	.022	.018	23 .020
03	.008	.008	.012	.012	.012	.012	.012	.014	.019	.023	.025	.013	.009	.012	.015	.014	.014	.013	.012	.012	.012	.012	.012	.012	24 .013
04	.008	.010	.014	.014	.013	.014	.014	.017	.021	.022	.026	.023	.021	.017	.016	.015	.015	.015	.014	.013	.014	.013	.014	.013	24 .016
05	.011	.014	.014	.014	.014	.014	.014	.016	.020	.020	.019	.018	.017	.017	.015	.015	.015	.015	.014	.014	.014	.014	.014	.014	24 .015
06	.009	.014	.016	.013	.013	.014	.015	.016	.017	.016	.016	.016	.024	.018	.016	.015	.015	.015	.015	.014	.014	.020	.028	.029	24 .017
07	.022	.013	.006	.032	.013	.013	.013	.014	.014	.015	.014	.014	.014	.014	.013	.013	.014	.013	.013	.014	.014	.013	.013	.013	24 .014
08	.008	.001	.003	.014	.015	.014	.014	.017	.019	.016	.016	.015	.015	.015	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	24 .013
09	.015	.014	.014	.014	.014	.014	.014	.018	.017	.016	.015	.015	.015	.015	.014	.014	.014	.015	.015	.014	.014	.015	.015	.015	24 .015
10	.012										.019	.020	.020	.020	.020	.017	.015	.015	.015	.014	.014	.015	.014	.016	15 .016
11	.015	.014	.014	.014	.017	.015	.016	.020	.014	.015	.016	.013	.016	.016	.015	.015	.014	.014	.014	.014	.014	.014	.014	.014	24 .015
12	.009	.001	.003	.014	.014	.014	.014	.014	.014	.015	.016	.016	.014	.017	.016	.015	.014	.014	.014	.014	.014	.014	.014	.014	24 .013
13	.005	.001	.002	.014	.015	.014	.015	.021	.028	.028	.021	.018	.016	.015	.015	.014	.014	.015	.015	.015	.014	.015	.014	.017	24 .015
14	.008	.001	.003	.015	.015	.015	.015	.016	.018	.023	.023	.022	.020	.019	.017	.016	.017	.016	.017	.015	.016	.015	.015	.016	24 .016
15	.002	-.003	-.007	.004	.004	.005	.003	.004	.012	.004	.004	.006	.007	.010	.007	.008	.009	.009	.009	.008	.008	.010	.012	.008	24 .006
16	.013	.005	.010	.040	.041	.038	.038	.043	.048	.046	.047	.049	.018	.021											14 .033
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	16	17	17	17	17	17	17	
MN	.002	-.003	-.007	.004	.004	.005	.003	.004	.012	.004	.004	.006	.007	.010	.007	.008	.009	.009	.009	.008	.008	.010	.012	.008	-.007
MX	.027	.022	.022	.040	.041	.038	.038	.043	.048	.046	.047	.049	.026	.022	.021	.020	.020	.020	.019	.019	.021	.025	.028	.029	.049
ME	.013	.009	.010	.019	.018	.018	.017	.020	.023	.023	.022	.020	.017	.016	.016	.015	.015	.015	.015	.014	.014	.015	.016	.016	.016

Table 28. Hourly NO_2 Averages in ppm - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.048	.040	.043	.046	.046	.043	.041	.036	.041	.043	.037	.034	.028	.023	.022	.022	.018	.021	.027	.032	.037	.033	.040	.044	24 .035
31	.051	.040	.043	.048	.048	.046	.043	.038	.037	.042	.044	.031	.027	.025	.025	.019	.022	.020	.023	.032	.036	.043	.045	.045	24 .036
01	.035	.029	.030	.039	.039	.039	.036	.033	.035	.040	.043	.051	.045	.033	.029	.027	.026	.027	.025	.034	.049	.047	.050	.049	24 .037
02	.052	.043	.044	.052	.049	.047	.041	.037	.038	.044	.052	.059	.041	.034	.031	.025	.025		.027	.034	.048	.052	.049	.044	23 .042
03	.041	.040	.039	.034	.029	.029	.029	.028	.031	.035	.038	.033	.031	.040	.047	.040	.032	.028	.026	.037	.051	.040	.031	.036	24 .035
04	.041	.048	.036	.035	.044	.048	.044	.041	.042	.040	.051	.053	.052	.043	.038	.032	.033	.033	.036	.039	.046	.060	.061	.032	24 .043
05	.025	.032	.035	.034	.037	.042	.042	.038	.036	.032	.030	.031	.033	.037	.028	.026	.027	.030	.028	.037	.041	.036	.030	.027	24 .033
06	.020	.027	.031	.025	.025	.027	.034	.030	.024	.021	.023	.024	.037	.031	.034	.027	.028	.033	.036	.047	.053	.053	.052	.051	24 .033
07	.042	.033	.035	.050	.024	.019	.025	.020	.019	.020	.019	.019	.019	.017	.018	.018	.018	.018	.018	.019	.023	.038	.043	.046	24 .026
08	.036	.031	.032	.036	.032	.033	.043	.041	.038	.022	.020	.019	.020	.018	.019	.019	.020	.019	.018	.018	.026	.042	.055	.051	24 .029
09	.051	.046	.059	.052	.051	.054	.073	.067	.044	.020	.024	.023	.024	.024	.022	.023	.030	.031	.040	.056	.042	.043	.042	.040	24 .041
10	.022										.049	.053	.054	.062	.074	.054	.039	.036	.054	.044	.050	.057	.053	.060	15 .051
11	.051	.047	.038	.040	.051	.035	.020	.035	.013	.016	.018	.009	.016	.016	.014	.016	.013	.015	.015	.014	.019	.020	.016	.014	24 .023
12	.009	.001	.007	.017	.010	.010	.010	.011	.010	.009	.011	.012	.011	.016	.019	.019	.014	.016	.020	.022	.025	.022	.027	.028	24 .015
13	-*017	-.014	-.006	.005	.011	.009	.007	.002	.003	.009	.008	.001	-.012	-.015	-.018	-.017	-.015	-.015	-.014	-.013	-.011	.003	.008	.013	24 -.004
14	.045	.026	.024	.035	.030	.034	.034	.035	.029	.040	.044	.040	.040	.035	.031	.027	.028	.028	.039	.046	.044	.029	.027	.028	24 .034
15	.038	.022	.017	.021	.025	.027	.022	.025	.029	.021	.021	.024	.025	.031	.032	.020	.017	.016	.018	.020	.021	.018	.015	.019	24 .023
16	.012	.005	.004	.015	.019	.026	.032	.035	.036	.043	.048	.050	.023	.032											14 .027
N	17	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	16	17	17	17	17	17	17	
MI	.009	-.014	-.006	.005	.010	.009	.007	.002	.003	.009	.008	.001	-.012	-.015	-.018	-.017	-.015	-.015	-.014	-.013	-.011	.003	.008	.013	-.018
MX	.052	.048	.059	.052	.051	.054	.073	.067	.044	.044	.052	.059	.054	.062	.074	.054	.039	.036	.054	.056	.053	.060	.061	.060	.074
ME	.036	.029	.030	.034	.033	.033	.034	.032	.030	.030	.032	.032	.028	.028	.027	.023	.022	.022	.026	.030	.035	.037	.038	.037	.031

Table 29. Hourly NO_X Averages in ppm - Aug-Sept. 1976 - Station 2, Collinsville, CA.

	HOUR																								
DAY	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	N MEAN
30	.072	.063	.064	.076	.078	.076	.070	.066	.077	.071	.058	.053	.043	.038	.036	.039	.030	.035	.040	.046	.052	.047	.055	.060	24 .056
31	.067	.045	.052	.066	.067	.068	.067	.065	.070	.074	.067	.049	.042	.039	.039	.033	.036	.034	.037	.045	.051	.058	.061	.062	24 .054
01	.056	.045	.052	.070	.069	.071	.063	.064	.071	.081	.082	.089	.075	.057	.052	.048	.047	.049	.045	.055	.075	.078	.081	.084	24 .065
02	.071	.056	.054	.068	.065	.060	.048	.049	.055	.061	.070	.075	.051	.043	.039	.034	.033		.034	.043	.054	.059	.063	.054	23 .054
03	.044	.040	.043	.039	.035	.034	.034	.036	.045	.052	.056	.040	.037	.044	.052	.045	.038	.034	.032	.040	.052	.043	.035	.040	24 .041
04	.038	.046	.039	.038	.045	.049	.045	.047	.052	.052	.063	.063	.060	.049	.043	.038	.038	.037	.040	.041	.047	.058	.058	.035	24 .047
05	.029	.039	.042	.040	.043	.040	.047	.047	.049	.046	.044	.043	.044	.046	.037	.035	.036	.038	.036	.044	.046	.042	.037	.035	24 .041
06	.024	.034	.040	.032	.032	.033	.040	.039	.035	.032	.033	.034	.052	.041	.042	.035	.035	.040	.043	.050	.055	.063	.070	.069	24 .042
07	.057	.041	.035	.072	.032	.028	.033	.030	.029	.030	.028	.028	.027	.026	.026	.027	.027	.027	.027	.028	.031	.043	.047	.049	24 .034
08	.036	.027	.028	.041	.038	.038	.047	.048	.048	.031	.030	.028	.028	.026	.027	.027	.028	.027	.026	.026	.033	.045	.057	.053	24 .035
09	.052	.049	.060	.055	.053	.056	.072	.071	.051	.036	.032	.032	.032	.032	.031	.032	.037	.038	.045	.057	.046	.046	.046	.045	24 .046
10	.027										.058	.061	.062	.069	.078	.059	.044	.043	.058	.048	.052	.059	.056	.063	15 .056
11	.064	.060	.053	.055	.066	.052	.041	.059	.035	.038	.039	.033	.038	.038	.036	.037	.035	.036	.036	.035	.038	.039	.037	.035	24 .043
12	.027	.015	.020	.037	.032	.032	.032	.033	.033	.032	.034	.036	.034	.039	.041	.039	.035	.036	.039	.041	.044	.041	.045	.046	24 .035
13	.026	.028	.031	.051	.056	.055	.053	.056	.064	.068	.061	.053	.039	.036	.033	.034	.035	.035	.036	.036	.038	.050	.054	.061	24 .045
14	.042	.021	.021	.039	.036	.039	.039	.040	.037	.052	.055	.051	.049	.043	.038	.035	.035	.036	.045	.048	.047	.035	.033	.035	24 .040
15	.050	.026	.022	.031	.034	.037	.031	.034	.044	.032	.031	.035	.037	.045	.043	.035	.033	.032	.033	.034	.034	.033	.033	.033	24 .035
16	.023	.010	.012	.052	.057	.063	.070	.077	.084	.089	.095	.099	.039	.052											14 .059
N	18	17	17	17	17	17	17	17	17	17	18	18	18	18	17	17	17	16	17	17	17	17	17	17	
MN	.023	.010	.012	.031	.032	.028	.031	.030	.029	.030	.028	.028	.027	.026	.026	.027	.027	.027	.026	.026	.031	.033	.033	.033	.010
MX	.072	.063	.064	.076	.078	.076	.072	.077	.084	.089	.095	.099	.075	.069	.078	.059	.047	.049	.058	.057	.075	.078	.081	.084	.099
ME	.045	.038	.039	.051	.049	.049	.049	.051	.052	.052	.052	.050	.044	.042	.041	.037	.035	.036	.038	.042	.047	.049	.051	.051	.045

5.2.1 Additional Data from Station 2 Near Collinsville, CA

At the 6 May 1977 meeting in which the key findings from this program were presented to the ARB research staff by the participating contractors (Caltech, MRI, Inc., and the AMC), it was learned that the meteorological conditions were unusual during the few days before the 30 August 1976 start of the formal program. In particular, unusually high temperatures were observed at the 850 mb level. Therefore, a request was made to reduce and tabulate the data from Station 2 for this period of time.

Tables 30 and 31 give the one-hour average data for 26 August 1976 through 29 August 1976. The corresponding five-minute data points are included in the data volume. In contrast to the usual procedure of using the daily zero and span calibrations in the reduction of the data from each day, these results were calculated using the calibrations obtained in the quality assurance audit of the station on 26 August 1976. The reduction and tabulation of these data are work beyond the original scope of the contract, so instead of the usual procedure of editing the five-minute data before calculating the one-hour average, the averages containing invalid data are crossed out. The major causes of invalid data are the daily zero and span calibrations which take place just after midnight, and the quality assurance audit performed on 27 August 1976. It is believed that little inconvenience will be caused by this shortcut in the reduction of these data.

Column 1 of Table 31 gives the daily zero readings of the instruments resulting from the use of the quality assurance calibration constants. These numbers differ from zero by more than is usual, and indicate that the station zero air contained lower concentrations of nitrogen oxides and a higher concentration of sulfur dioxide than the zero air used in the quality assurance audit. Users of the data in Tables 30 and 31 may wish to make correction for the offsets reported there. It should be noted that the zero readings are stable.

Table 30. One-Hour Average Meteorological Data for 26 August through 29 August 1976 from Station 2 Near Collinsville, CA

DAY	HOUR 00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Lower Level Wind Speed (mph)																								
26	23.2	21.1	14.6	18.5	17.2	17.7	15.1	11.5	9.5	9.9	8.8	6.0	8.2	12.5	13.4	16.2	15.2	16.9	19.9	18.1	19.2	18.9	20.2	18.9
27	19.1	18.7	15.2	15.7	15.7	12.8	10.2	9.7	14.7	13.8	9.9	8.7	9.2	11.5	14.1	13.1	12.9	17.4	17.5	16.9	18.1	19.5	19.7	20.2
28	18.1	14.1	15.0	14.2	9.9	11.3	13.6	12.0	10.5	9.4	8.8	5.6	7.8	12.3	13.8	11.6	16.7	15.2	16.0	19.7	22.9	20.5	17.1	16.7
29	20.1	21.1	21.9	16.3	21.1	19.5	23.2	16.0	17.5	11.4	10.6	8.1	9.5	12.5	11.8	9.9	10.9	14.8	11.7	14.4	16.9	20.8	21.1	18.1
Upper Level Wind Speed (mph)																								
26	25.9	25.1	19.6	23.0	21.9	22.6	20.9	13.8	11.9	8.9	8.5	8.2	7.3	12.1	13.4	15.2	15.0	16.8	19.5	21.9	25.3	23.7	22.2	19.4
27	22.9	23.8	20.3	20.1	19.4	19.1	14.3	13.8	12.9	12.0	8.9	9.0	8.3	11.1	13.9	12.1	11.8	15.9	19.0	21.8	20.9	24.7	24.0	24.5
28	22.9	19.6	17.9	15.7	11.7	14.1	15.9	15.6	10.8	10.6	9.1	5.7	7.9	12.1	13.3	10.6	14.3	15.2	16.3	21.6	26.8	23.8	22.8	22.1
29	23.7	25.1	25.6	23.0	21.2	23.8	24.0	19.1	17.2	10.1	9.4	8.1	8.9	10.0	11.3	9.1	10.0	12.5	13.7	16.5	21.8	24.9	25.3	23.1
Temperature (^{o}C)																								
26	17.0	15.9	15.7	16.0	15.1	14.6	14.7	15.3	17.8	19.5	21.5	23.9	25.6	26.4	28.4	28.8	29.5	29.6	27.6	24.5	22.5	21.4	21.0	19.4
27	17.9	17.1	17.9	17.8	18.8	16.9	16.5	17.1	18.9	22.5	25.1	27.1	28.9	30.6	31.2	31.8	32.1	31.7	30.7	29.1	25.6	24.1	22.9	22.8
28	19.7	19.5	19.5	18.6	17.7	16.8	16.6	16.9	18.6	21.6	25.0	27.6	30.2	31.7	32.8	33.4	33.7	33.9	31.9	27.8	24.0	22.7	21.2	20.2
29	18.1	17.2	15.8	15.5	15.3	14.8	14.2	14.7	16.4	19.0	23.1	26.1	29.4	30.6	33.1	33.1	33.5	34.0	33.6	29.0	26.5	24.5	24.8	24.8
Temperature Difference (^{o}C)																								
26	-0.3	-0.1	0.6	0.6	0.3	0.3	0.5	0.2	-0.4	-0.9	-1.0	-1.2	-1.1	-1.2	-1.1	-1.1	-1.0	-0.9	-0.7	-0.2	0.7	1.5	2.8	4.4
27	3.5	3.1	3.6	4.0	3.8	4.5	2.9	1.2	3.3	1.5	-0.7	-1.0	-1.1	-1.2	-1.1	-1.0	-1.2	-0.9	-0.7	0.1	0.6	1.8	2.3	2.5
28	3.8	3.3	4.2	6.1	3.6	3.5	2.3	0.8	-0.6	-0.9	-1.0	-0.9	-1.1	-1.2	-1.3	-1.1	-1.2	-1.1	-0.8	0.3	2.1	2.3	1.7	2.8
29	5.2	5.9	3.9	1.4	5.4	3.1	4.4	1.5	5.7	0.6	-0.3	-1.1	-0.9	-0.5	-1.0	-1.0	-1.1	-0.8	-0.4	2.5	1.6	1.2	1.2	2.2
Relative Humidity (%)																								
26	32.9	35.1	35.8	35.2	37.2	38.3	38.0	36.6	31.2	27.8	24.8	21.5	19.5	18.7	16.4	16.1	15.4	15.4	17.3	20.7	23.3	25.1	25.6	28.3
27	31.0	32.7	31.1	31.3	29.3	33.1	33.9	32.8	29.2	23.4	20.0	17.7	16.0	14.5	14.0	13.5	13.3	13.6	14.4	15.8	19.4	21.2	22.9	23.0
28	27.8	28.0	28.1	29.8	31.4	33.5	33.8	33.2	29.9	24.8	20.1	17.3	14.8	13.6	12.8	12.4	12.1	12.0	13.5	17.1	21.3	23.1	25.3	26.9
29	30.6	32.5	35.4	36.4	36.8	37.9	39.4	38.2	34.3	29.1	22.7	18.9	15.5	14.5	12.7	12.6	12.3	12.0	12.3	16.0	18.4	20.7	20.4	20.3
Broad Band Solar Radiation (Cal cm^{-2}min^{-1})																								
26	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.4	0.7	1.0	1.2	1.3	1.4	1.4	1.1	0.9	0.6	0.3	0.0	-0.0	-0.0	-0.0	-0.0
27	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	0.1	0.5	0.8	1.1	1.3	1.4	1.4	1.4	1.2	0.9	0.6	0.3	0.0	-0.0	-0.0	-0.1	-0.0
28	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0	-0.0	0.1	0.5	0.8	1.1	1.3	1.4	1.4	1.3	1.1	0.9	0.6	0.3	0.0	-0.0	-0.0	-0.0	-0.0
29	-0.1	-0.1	-0.1	-0.0	-0.1	-0.1	-0.0	0.1	0.5	0.8	1.1	1.3	1.4	1.4	1.3	1.1	0.8	0.5	0.3	0.0	-0.0	-0.0	-0.0	-0.0

Table 31. One-Hour Average Concentrations in ppm for 26 August through 29 August 1976 1976 from Station 2 Near Collinsville, CA. (See text for discussion of crossed out data.)

DAY	Zero Air	HOUR 01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Sulfur Dioxide - SO_2																								
26	.015	~~.017~~	.023	.030	.030	.035	.041	.039	.049	.025	.017	.017	.017	.023	.021	.023	.015	.019	.019	.017	.018	.016	.028	.035
27	.015	~~.034~~	.038	.025	.036	.024	.025	.030	.037	.035	.047	.035	.024	.019	.021	.017	~~.030~~	~~.033~~	~~.036~~	.026	.019	.025	.052	.028
28	.015	~~.050~~	.040	.036	.038	.036	.031	.032	.036	.045	.040	.034	.024	.017	.015	.016	.030	.027	.015	.022	.032	.020	.030	.025
29	.014	~~.050~~	.026	.030	.027	.026	.032	.033	.030	.030	.028	.033	.023	.026	.019	.016	.020	.019	.016	.019	.028	.025	.044	.046
Ozone - O_3																								
26	-0.01	-.006	-.007	-.002	.005	-.004	-.004	-.001	.004	.016	.022	.028	.035	.054	~~.114~~			*067	.049	.026	.010	.010	.010	.004
27	-0.01	.012	-.001	.004	.004	.004	.004	.004	.010	.027	.034	.050	.054	.063	~~.077~~	.072	.061	~~.089~~	.069	.053	.023	.015	.005	.013
28	-0.01	.007	-.001	.004	.004	.011	.004	.009	.018	.025	.040	.059	.078	.097	.110	.147	.122	.109	.098	.062	.037	.021	.010	.006
29	-0.01	.008	.001	.004	.004	.004	.004	.006	.012	.019	.039	.060	.084	.096	.110	.112	.124	.129	.110	.080	.038	.016	.007	.006
Nitric Oxide - NO																								
26	-.016	-.021	-.016	-.010	-.010	-.009	-.008	-.004	.000	-.005	-.006	-.007	-.009	-.008	-.001	-.001	-.001	-.002	-.001	-.001	-.002	-.001	-.001	.006
27	-.016	.021	.018	.022	.012	.016	.015	.019	.025	.019	.010	.003	-.000	~~.275~~	~~.091~~	-.000	-.004	~~.003~~	.000	-.001	-.002	-.001	-.000	.002
28	-.015	.003	.011	.009	.009	.008	.004	.006	.009	.012	.005	.002	-.000	-.001	-.001	-.001	-.002	-.001	-.001	-.001	-.001	-.001	-.001	.000
29	-.016	.012	-.007	-.000	.001	-.001	.002	.006	.011	.009	.003	.001	-.001	-.001	-.001	-.001	-.001	-.002	-.001	-.001	-.001	-.002	-.001	-.001
Nitrogen Dioxide - NO_2																								
26	-.019	-.008	-.000	.005	.004	.007	.008	.003	.001	-.003	-.001	-.005	-.007	-.004	.001	.004	-.002	.001	.005	.011	.020	.012	.013	.027
27	-.019	.022	.026	.032	.030	.028	.025	.024	.029	.035	.031	.020	.005	~~.019~~	~~.053~~	.000	-.005	~~.026~~	.003	.009	.021	.017	.031	.030
28	-.018	.019	.025	.028	.029	.028	.026	.020	.021	.025	.018	.014	.007	.003	.002	.006	.007	.004	.006	.008	.015	.014	.026	.030
29	-.018	.016	.013	.021	.022	.019	.019	.015	.015	.016	.014	.008	.004	.003	.003	.001	.004	.004	.006	.019	.025	.022	.031	.036
Oxides of Nitrogen - NO_x																								
26	-.025	-.020	-.007	.004	.002	.006	.008	.007	.009	-.000	.002	-.004	-.008	-.004	.007	.009	.004	.006	.011	.016	.025	.017	.018	.040
27	-.026	.052	.051	.061	.049	.050	.048	.050	.061	.062	.048	.030	.012	~~.308~~	~~.150~~	.006	-.002	~~.116~~	.009	.014	.026	.021	.037	.038
28	-.025	.025	.044	.045	.045	.045	.042	.037	.033	.037	.044	.030	.022	.013	.008	.007	.011	.011	.009	.011	.012	.019	.019	.031	.037
29	-.025	.013	.013	.027	.029	.024	.028	.028	.033	.032	.024	.015	.010	.009	.008	.006	.009	.009	.011	.023	.030	.026	.036	.042

Rockwell International
Atomics International Division
Air Monitoring Center

APPENDIX

QUALITY ASSURANCE AUDITS OF THE DOW AIR MONITORING STATIONS

Internal Letter — Rockwell International

Date: . No: .

TO: (Name, Mail Code & Internal Address) L. W. Richards

FROM: (Name, Mail Code & Internal Address, Phone) D. B. Gemmill

Subject: QA Audit of the Dow Air Monitoring Stations

Introduction

On August 26, 1976*, a quality assurance audit of the Dow fixed air monitoring station (Dow #2) was conducted. Furthermore, on August 31, 1976, an audit of the Dow mobile station (Dow #1), then located in a school bus yard in Brentwood, California, was conducted. This report summarizes the major deficiencies found by QA during these audits, and it also gives an accounting of the results obtained during the calibration checks.

Parameters Checked

1. General operational performances at stations.
2. Mass flow controller calibrations.
3. NO, NO_2, NO_x analyzer, NO_2, converter efficiency.
4. O_3 analyzer
5. SO_2 analyzer
6. HC analyzer
7. Station zero air quality
8. Temperature and dew point sensors
9. Wind equipment
10. Automatic calibration system
11. Cleanliness of sample manifold, candy cane, and filters

Methods Used by QA

1. Mass flow controller calibrations. Span gas flows were checked with a Hastings bubblemeter kit. Dilution air flows were checked with a QA mass flowmeter, the calibration of which checked to within 1.0% of actual flow upon its return to the QA lab.

*The audit was performed on 26 and 27 August 1976, and the instrument calibrations were performed on the 27th.

Methods Used by QA (cont'd)

2. Aerometric Analyzers. Five-point calibrations were performed upon each of the analyzers by QA by means of a portable calibrator, which is equipped with its own flow metering devices, gas mixing chambers and ozone generating lamp. NO and CH_4 span gases were obtained from independently calibrated QA cylinders, and were diluted in the portable calibrator to achieve the desired concentrations. An NBS certified permeation tube was utilized for SO_2. Dilution air was obtained by plumbing into the station compressor system, and passing it through a QA air scrubbing system before entering the portable calibrator. The known ppm values were then introduced into each analyzer at the point where the sample lines attach to the sample manifold. Gas concentrations were introduced at atmospheric pressure so that each analyzer would draw air at the same rate as from the sample manifold. The ppm values were then recorded along with their corresponding analyzer voltage outputs, and linear least square data fits were applied. The resulting functions were then compared to functions obtained from station calibration data taken as close as possible to the time of the audit.

3. Station zero air quality. The NO-NO_x, O_3, and SO_2 analyzers were zeroed with station zero air, and subsequently zeroed again after passing the air through the QA air scrubber system.

4. Temperature and dew point sensors. Station print-out temperature and dew point values were concurrently compared to values obtained by means of an NBS traceable sling psychometer.

5. Wind equipment. Orientation of the wind direction (mast should line up with true north) was checked with a field compass. Prevailing wind direction, estimated from vane orientation, was checked against station print-outs. A check of wind speeds was made by experienced estimation.

6. Automatic calibration system. Checked by examining station print-outs for the appropriate status symbol and noting the corresponding flow controller and analyzer outputs.

Operational Problems Encountered During Audit

A. Dow #2 - 8/26/76

1. Sample manifold and candy cane dirty. Should be cleaned on a routine and frequent basis. The spare fitting on the glass cross connecting the candy cane and sample manifold is stoppered with natural cork. This cork should be replaced with a glass stopper equipped with the appropriate O-rings.

2. Analyzer manuals not in station.

3. The midnight auto span of 8/26/76 failed due to an electrical problem. Corrected by Rockwell by 8/31/76. At that time, however, the NO auto span failed, the span beginning with ozone entering the calibrate manifold. Note: Station analyzer calibration data was taken by QA by means of manually entering the calibrate mode. Station automatic calibration system needs debugging and careful observation.

B. Dow #1 - 8/31/76

1. Sample manifold and candy cane dirty. Should be cleaned on a routine and frequent basis. The spare fitting on the glass cross connecting the candy cane and sample manifold is stoppered with natural cork. This cork should be replaced with a glass stopper equipped with the appropriate O-rings.

2. Ozone generating lamp burned out. This prevented the station calibration of NO_2 and O_3 channels. A new lamp should be installed.

3. Dilution air pressure falls to zero when catalytic oxidizer is utilized. This prevented calibrations of the HC analyzer by station system. A QA span was performed on the HC analyzer without zero air, after achieving analyzer zeros with and without zero air.

Operational Problems Encountered During Audit (cont'd)

B. 4. HC analyzer outputs erratic with respect to expected output values. Symptomatic of the need for analyzer timing system or internal flow adjustments. Repaired by Rockwell by 9/8/76.

5. Analyzer manuals missing from station. This delayed the afore-mentioned repairs above. Analyzer manuals should be kept in station.

6. NO and NO_x sample flow rotameters in NO-NO_x analyzer read significantly different flows, resulting in unusual and unreliable NO, NO_2, and NO_x. "A" constants (See Table 2). Analyzer flow orifaces should be cleaned.

Results

1. Flow controller calibrations - See Table 1.

A. Dow #2 - 8/26/76

The two flow controllers had been previously calibrated on 7/29/76 by means of a QA calibrated mass flowmeter nest, loaned to Dow. Linear fit functions were then generated and are listed at the bottom of Table 1. During the audit the only flows checked by QA were those used in analyzer calibrations, thus the column marked "analysis".

B. Dow #1 - 8/31/76

It is not known exactly when the two station flow controllers were calibrated, although it was done with the same nest as in Dow #2, and was probably done about a week before. Linear functions were generated in the same manner. The observed controller voltages during the flow check compared closely to the observed voltages during automatic spans, with the exception of the SO_2 voltage at this station. During the flow check the observed voltage was .273 v., while during the automatic span of about 12 hours earlier, during the SO_2 span, the span controller voltage read .430 v. This may indicate problems with this flow controller.

C. Conclusions

The errors in the span flow controllers are significant, particularly at the Dow #1 station. Periodic flow checks (at least once a month) with independently calibrated flow meters should be made routine. New flow constants would then be applied to station automatic span ppm calculations. Flow controller calibrations should be made within the entire flow controller range, such that multi-point analyzer calibrations can be accomplished.

2. Aerometric Analyzers - See Tables 2 and 2a

A. Dow #2 - 8/26/76

As previously mentioned, the station calibration data was taken from a manually activated calibration, which was accomplished right after the audit. No reason can be found for the rather large discrepancy in the NO_2 channel. There is no indication of NO_2 contamination in either the QA or station NO delivery systems. Analyzer converter efficiency is 100%. See below for a discussion of converter efficiency calculations.) Also there is good agreement in the O_3 channel, which is calibrated with NO_2 channel data. The discrepancy in SO_2 "B" constants may be explained by the fact that QA saturated the system with high concentrations of SO_2 before beginning the calibration, where this is not the case during automatic span calibrations. (See also below under C. Conclusions.) It was found that while attempting to zero the HC analyzer, electrical noise of up to 50 mv is experienced. For example, the station CH_4 constant is $y = .083 + 10.43x$. But if another arbitrarily selected zero voltage (which was observed) is used the function then becomes $y = .388 + 9.475x$. Then the % diff. in "B" constants becomes +4.9%, instead of the +15.4% diff. as listed in Table 2. Thus the HC data in Table 2 is somewhat arbitrary in nature, and this zero noise problem should warrant close observation.

B. Dow #1

Station data for NO_2, O_3, and for the HC analyzer are missing due to the aforementioned problems with the station ozone generating lamp and HC zero air and analyzer.

Agreement is close with the NO-NO_x analyzer, although it is unfortunate that no NO_2 comparisons could be made to see if the aforementioned problem as in Dow #2 persists.

There is a large discrepancy in SO_2, but the automatic span data of the previous midnight delivered .122 ppm SO_2, which is off scale, although the analyzer voltage read .991v at the time. The SO_2 span gas flow should be decreased.

HC audit data are included here due to the possibility that some HC data could then be saved.

C. Conclusions

The trend in the SO_2 "B" % diff. indicates that there may have been some consistent error. As SO_2 analyzers of this type are known to be particularly sample flow sensitive, it is possible that changes in the plumbing to the analyzer could be the cause of the problem. Next time a mass flow-meter could be placed in the sample line in such a way that the sample flow could be monitored, and the flow could be adjusted when switching sampling systems. This sort of test should be conducted between the station sample and calibrate systems as well. Also, it was found that the linearity of the SO_2 analyzers is questionable below .02 ppm. (See Fig. 1-2.)

D. Converter efficiency

The conversion efficiency (CE) of the NO_2 converter in each NO-NO_x analyzer was calculated from data obtained during NO and NO_2 calibrations. The CE is calculated by means of the equation:

$$CE = 100 \left[1 - \frac{(B_{NOx})(\Delta V_{NOx})}{(B_{NO})(\Delta V_{NO})} \right]$$

where B refers to the QA "B" constant, and ΔV is the voltage difference of the subscripted channel before and during ozone titration. A correction is applied to the measured voltages to correct for the difference in flows before and during ozone titration.

3. Station Zero Air Quality Test

Data from Table 3 indicates that station zero air voltages compare closely to zero voltages obtained by passing station air through the QA air scrubber system. The QA system has been recently tested in the QA lab by using a Monitor Labs $NO\text{-}NO_x$ analyzer and comparing "dead" (analyzer ozone lamp off) and "live" zeros.

4. Temperature Measurements

Data from Table 4 indicates that all station's temperature data are accurate within the range of experimental error.

5. Wind Equipment

Data from Table 5 shows that all wind equipment seem to be oriented correctly and operating normally.

6. Automatic Calibration System

As previously mentioned the calibration system at Dow #2 was not operating normally when QA left the area. With the Hc zero air and ozone lamp problems found at Dow #1 it is difficult to tell whether or not the system at that station operates satisfactorily. However, all the status indicators seem to work. It was found that analyzer outputs show the effects of span gases after their respective span calibration times. Thus much care must be taken in validating station ambient data. The SO_2 results in Table 2 may be explained by insufficient station calibration time, as QA wants at least 30 minutes at the high span point. More investigating should be undertaken to be sure that the SO_2 calibration times are of sufficient length. Auto span data should be examined on a daily basis, and records kept in the stations of zeros and span drift.

D. B. Gemmill

DBG:it

Attachments noted

Table 1. Flow Controll Calibration Checks

Station/ Date	Analysis	Volts	Flow,sccm	QA Flow	% Diff.
2	Dilution	.500	4100	4105	-0.1
8-26-76	Span: NO	.700	19.44	19.87	-2.2
	SO_2	.262	6.99	7.20	-2.9
	HC	.542	14.95	15.28	-2.1
1	Dilution	.493	4091	4023	+1.7
8-31-76	Span: NO	.651	16.25	15.73	+3.3
	SO_2	.273	6.50	6.25	+4.0
	HC	.525	13.00	12.38	+5.0

Station Constants:

y = flow in cc/min; x = volts

#2
Dilution : $y = 46.25 + 8102x$
Span : $y = -.4587 + 28.43x$

#1
Dilution : $y = -.5365 + 25.78x$
Span : $y = 131.4 + 8032x$

Table 2. Aerometric Analyzers

Station/ Date	Channel	"A" Constant(a) Station	"A" Constant(a) QA	"B" Constant(a) Station	"B" Constant(a) QA	% Diff. In B
2	NO	.007	.002	.497	.508	- 2.2
8-26-76	NOx	.012	.006	.479	.509	- 5.9
	NO_2	.006	-.002	.422	.506	-16.6
	O_3	.015	.015	.509	.503	+ 1.2
	SO_2	-.011	.007	.127	.106	+16.5
	CH_4	.083	.311	10.43	9.03	+15.4
	THC	.375	.159	9.16	9.94	- 7.9
	NMHC	.350	-.198	9.47	9.50	- 0.3
1	NO	-.055	-.061	.570	.571	- 0.2
8-31-76	NOx	-.018	-.016	.551	.568	- 3.0
	NO_2		.067		.559	
	O_3		.004		.641	
	SO_2	-.014	-.009	.138	.114	+21.1
	CH_4		-.286		8.91	
	THC		-.205		12.41	
	NMHC		-.071		12.33	

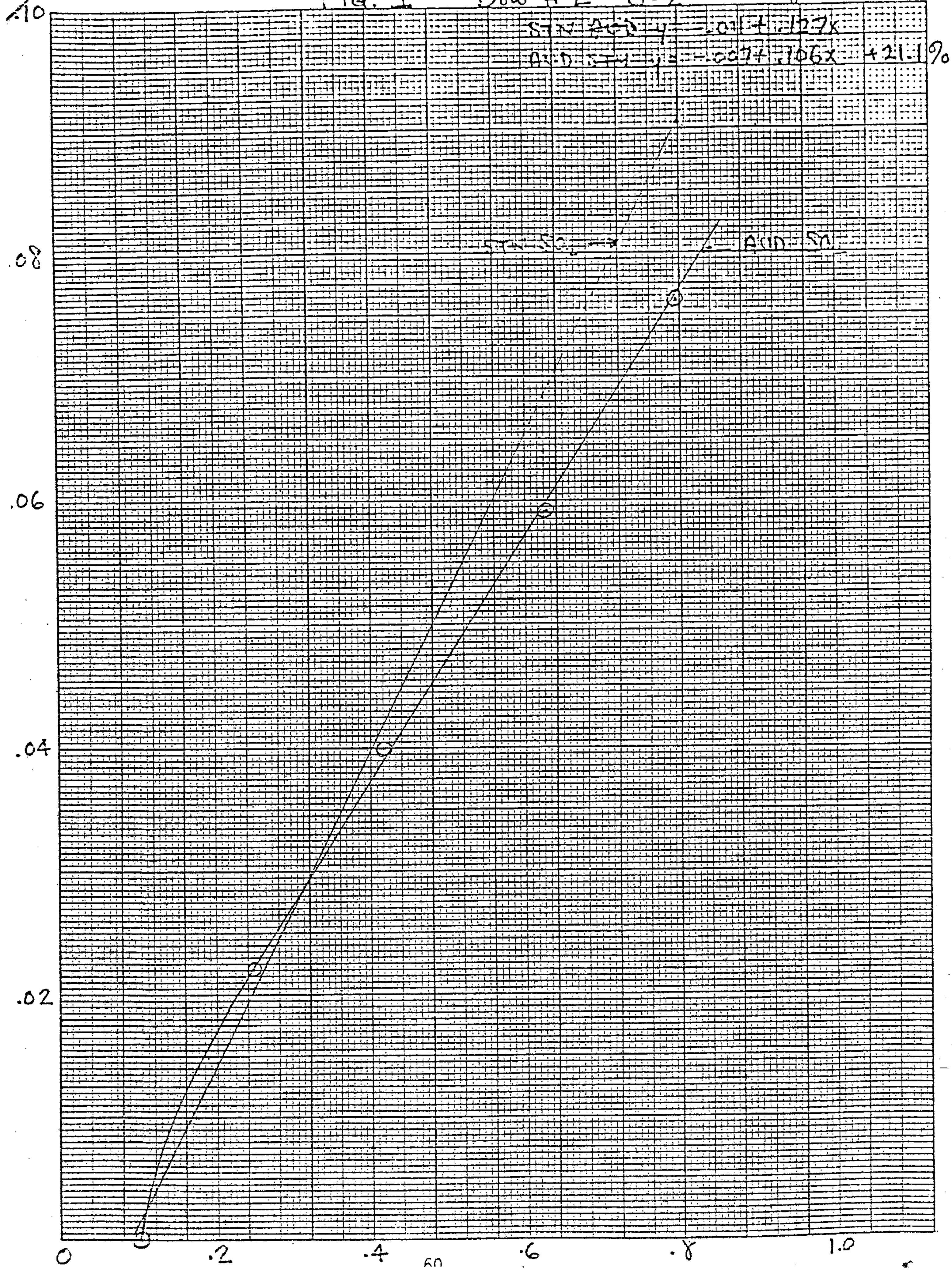
(a)When: $y = A + Bx$ y = ppm, x = volts

Table 2a. NO_2 Converter Efficiency

Station/ Date	Before O_3 Titration V_{NO}	Before O_3 Titration V_{NOx}	During O_3 Titration(b) V_{NO}	During O_3 Titration(b) V_{NOx}	B_{NOx}	B_{NO}	CE %
2 8-26-76	.811	.814	.368	.814	.509	.508	100.0
1 8-31-76	.882	.798	.507	.790	.568	.571	97.9

(b)Voltages corrected for difference in flow before and during O_3 titration.

FIG. 1 Dow #2 SO_2 6-26-76



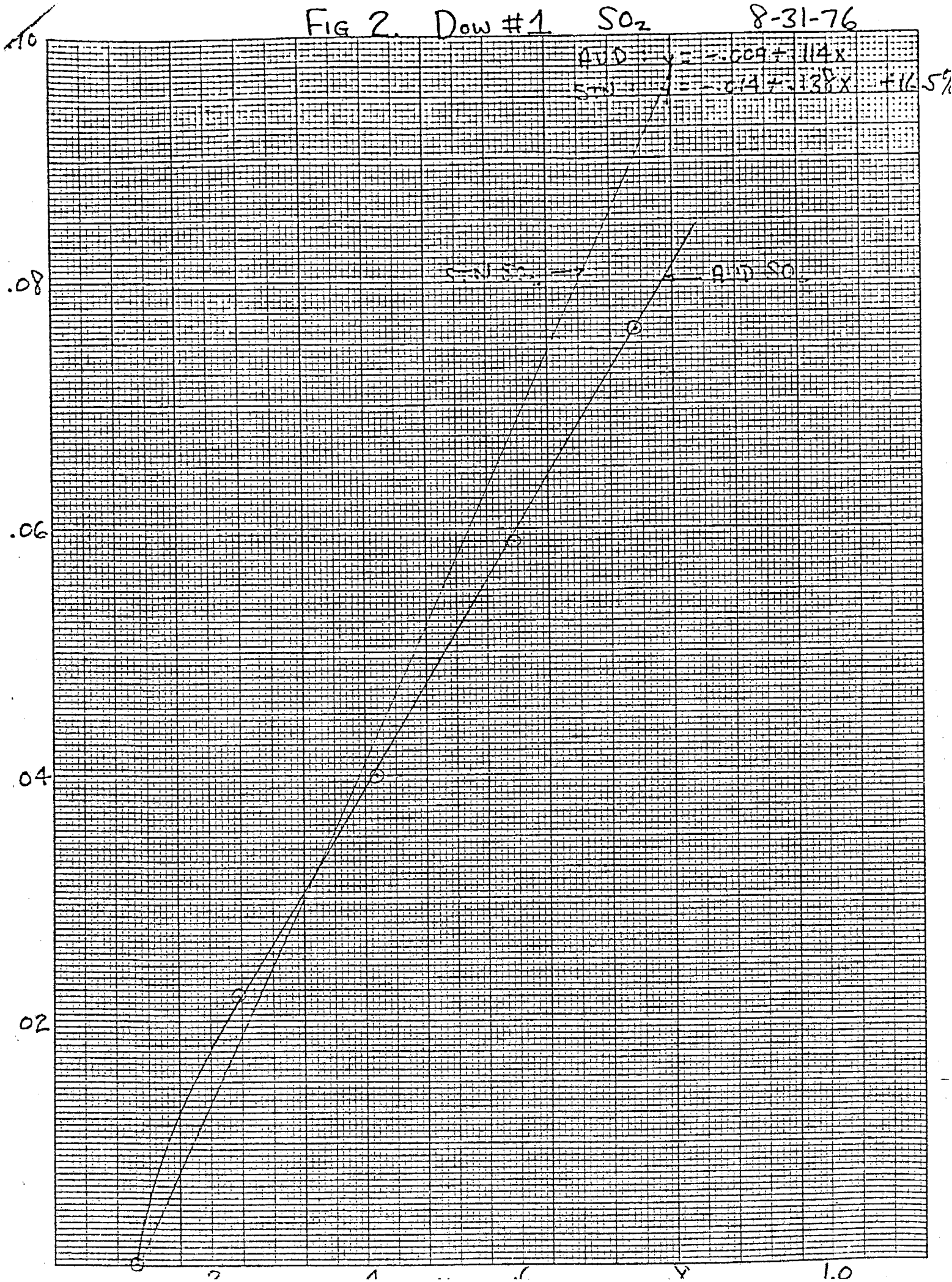


FIG 2. DOW #1 SO_2 8-31-76
.10
.08
.06
.04
.02
1.0

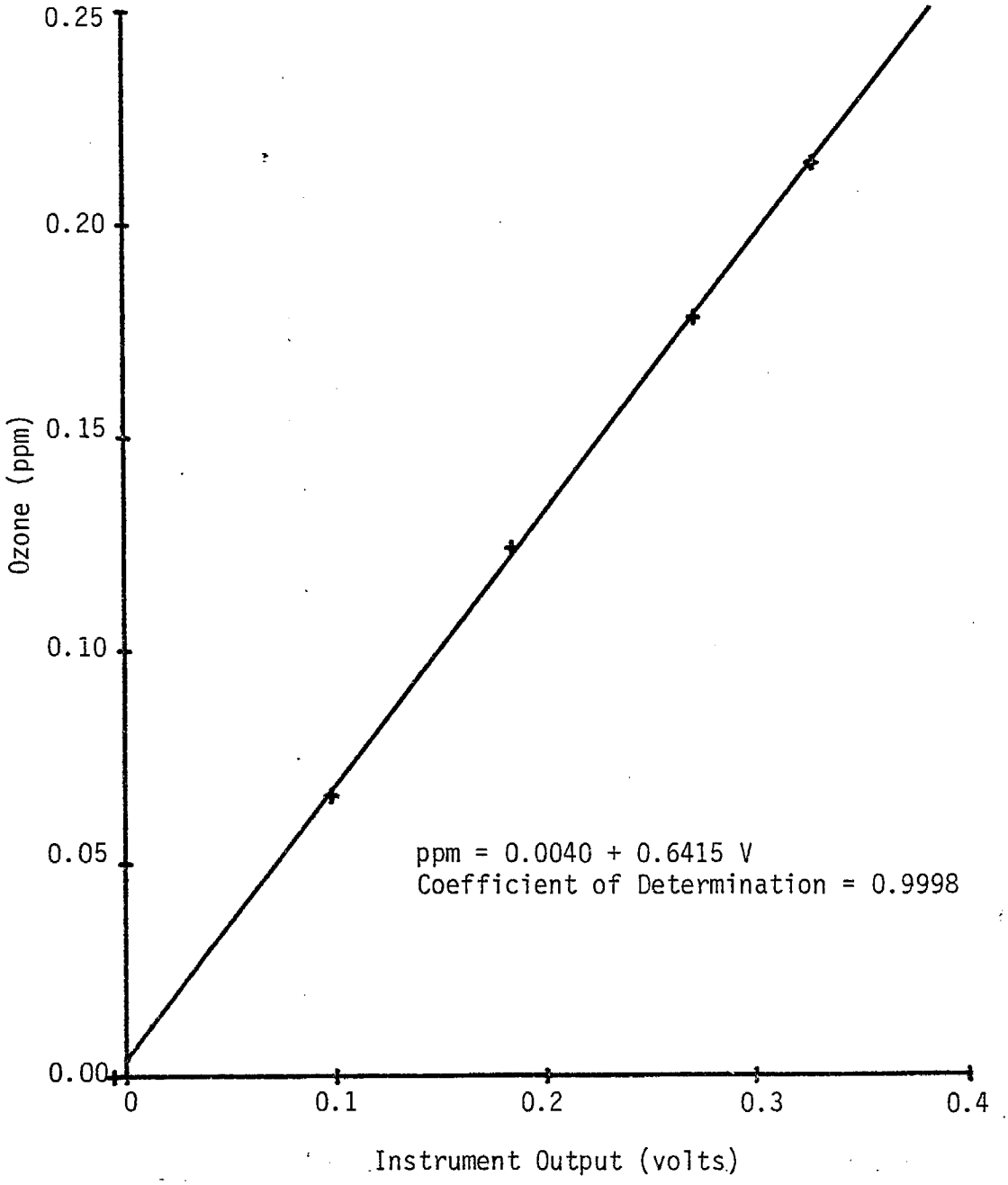


Figure 3. Five-point Calibration of the Dasibi Ozone Monitor at Brentwood, CA, 31 August 1976

(This figure was not part of the original audit report, and was prepared from data in the notebook records of the audit.)

Table 3. Station Zero Air Quality Test

Station/ Date	Channel	Instrument Voltage Station Zero Air	Instrument Voltage Air Thru QA Scrubber
2 8-26-76	NO	-.014	-.004
	NO_2	-.014	-.007
	O_3	-.029	-.022
	SO_2	.086	.102
1 8-31-76	NO	.097	.107
	NO_2	-.014	-.007
	O_3	.026	.008
	SO_2	.096	.104

Table 4. Temperature Measurements

Station/ Date	Outside Temp. °C Station	Outside Temp. °C QA	Dew Point °C Station	Dew Point °C QA
2 8-26-76	29.3	30.6	5.8	6.9
1 8-31-76	35.0	37.7	10.7	13.3

Table 5. Wind Equipment

Station/ Date	Wind Direction Station	Wind Direction Apparent	Wind Speed Station	Wind Speed Apparent
2 8-26-76	lo 275	270	22.0	20
	hi 279	270	25.0	20
1 8-31-76	321	330	5.2	5